TECHNOLOGY DEPT.

The Chemical Age

VOL LXIII 30 SEPTEMBER 1950 No 1629

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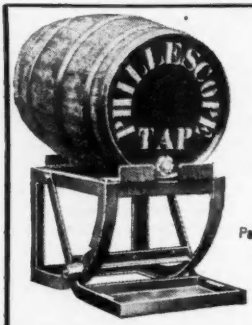

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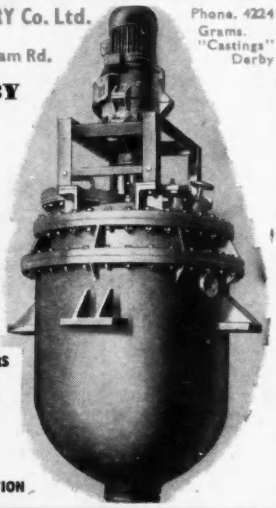

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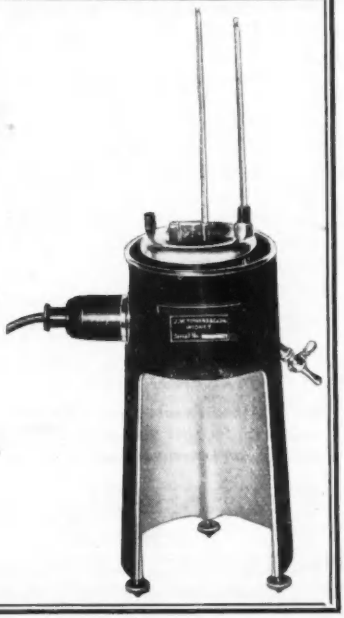

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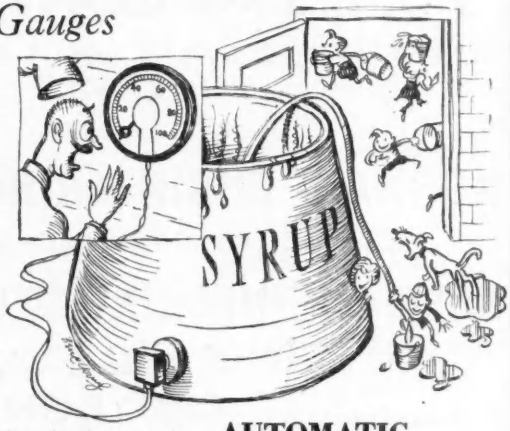
Syrup tanks fitted with Evershed Tank Contents Gauges



At their Plaistow Refinery, Messrs. Tate & Lyle Ltd. use the Evershed Tank Contents Gauge for indicating remotely the quantity of syrup in tanks.

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WRITE FOR SPECIFICATION C.H. 4

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WRITE FOR CATALOGUE No. 234

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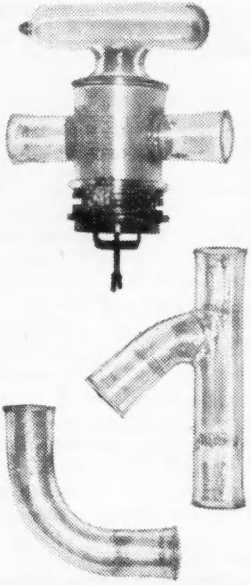

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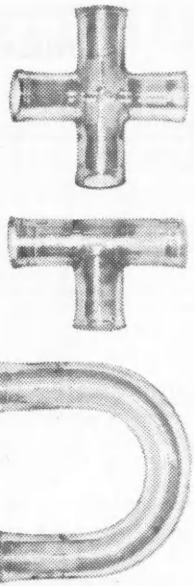

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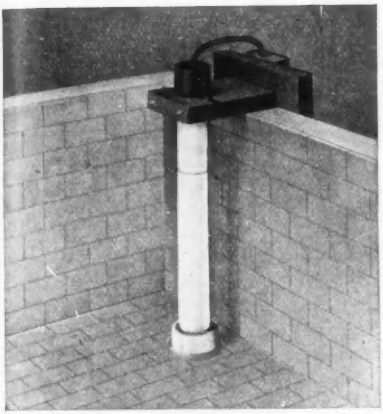

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ELECTRIC IMMERSION HEATERS

are ideal for heating acid pickling and electro-plating solutions, and other acid baths.

FEATURES :—

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- Minimum safe immersion depth marked on each heater.

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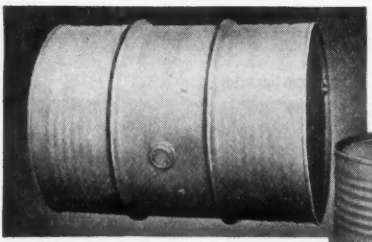

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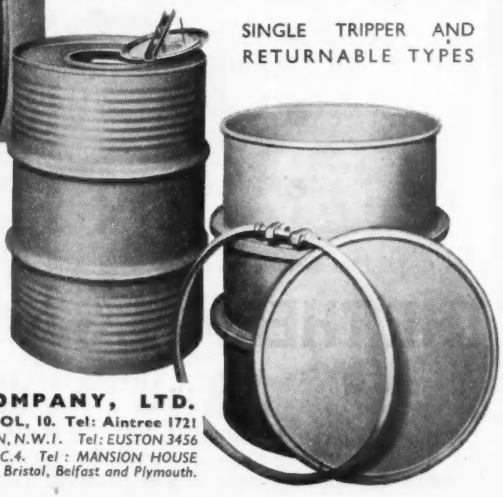

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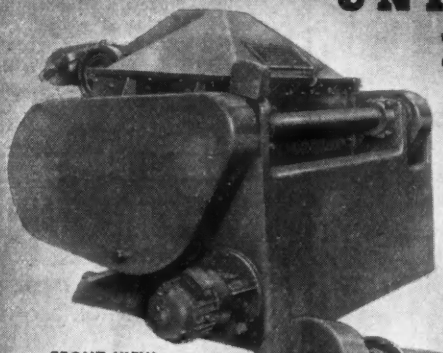
in a great variety of sizes, types and classes : for mixing under vacuum and/or pressure : from light slurries to heavy doughs : with jacketed troughs for heating or cooling : of stainless steel or other material when ingredients would contaminate ordinary iron or steel.



FRONT VIEW

A typical "Universal" is illustrated here. Capacity 110 gallons per mix. Note the clean design, the efficient screw tilt and the counter-balanced hood.

There are thousands of our mixers in use to-day many of which were built before this century.

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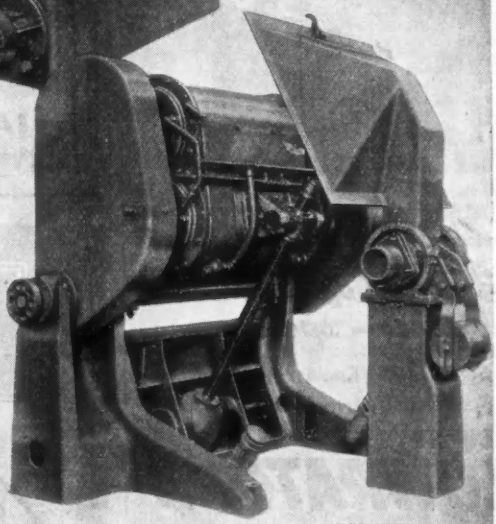

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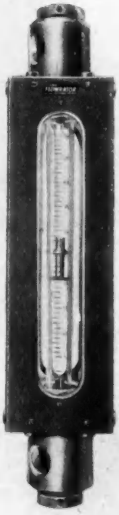

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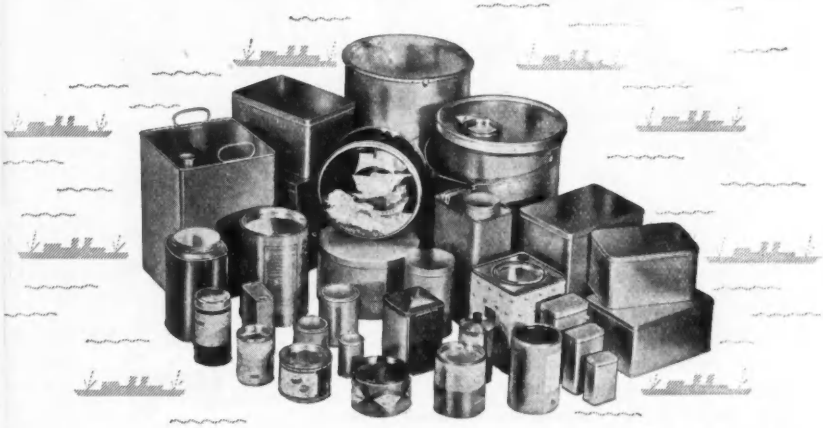

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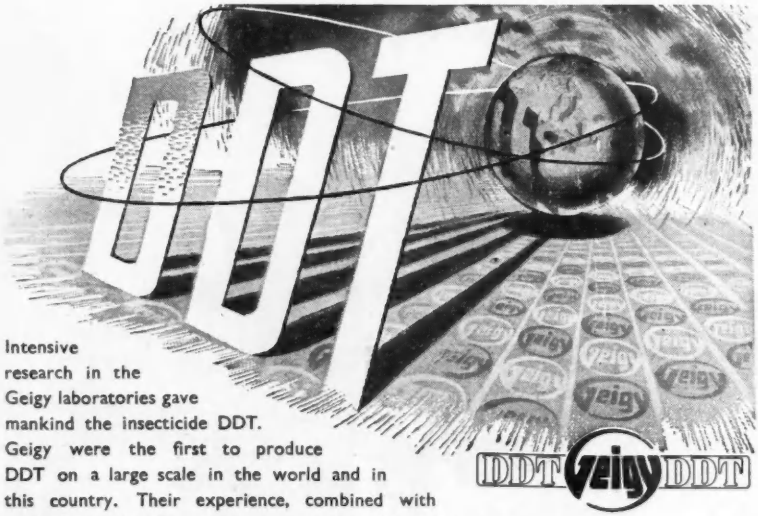

Intensive research in the Geigy laboratories gave mankind the insecticide DDT. Geigy were the first to produce DDT on a large scale in the world and in this country. Their experience, combined with meticulous scientific control, ensures the high quality demanded of the product.

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D.15

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We manufacture complete plant for producing Dextrines and British Gums, including ACIDIFIERS, COOLERS, BLENDERS, FURNACES and FANS, ELEVATORS and CONVEYORS.

Full particulars from :—

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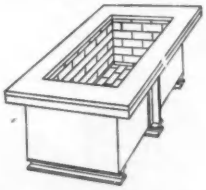
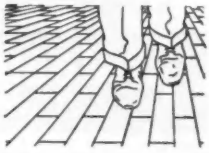
acid-proof masonry construction



Acid-proof Masonry Lining for Steel Tanks.

Acid and alkali-proof chemical cements for masonry protective linings and floors are included in the NUTRALINE range of anti-corrosion materials . . . . . by selection of, say, one of the following and in connection with one of our special membranes the most stubborn acid proofing masonry problem can be solved. We supply the materials alone but also engineer and carry out complete schemes.



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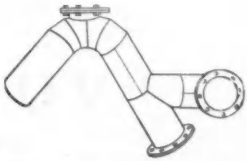
NUTRAKEY . . . . . a furane resin cement, inert to acid and alkalis, in all concentrations.

NUTRASIL . . . . . a dense, rapid setting, silicate cement, inert to all common inorganic acids, except hydrofluoric.

NUTRABOND . . . . . a plasticised, sulpur-base cement, inert to all inorganic acids, even hydrofluoric.



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Technical advice readily given in the selection of the correct cement.

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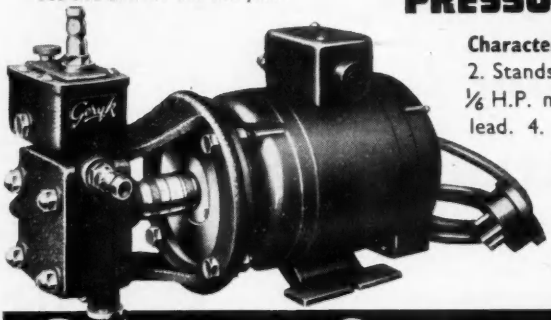
Geryk **VACUUM** or **PRESSURE PUMPS**



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The Weekly Journal of Chemical Engineering and Industrial Chemistry

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Volume LXIII 30 September 1950 Number 1629

Afterthoughts on Nationalisation

THE complexity and the diversity of methods and services of the widespread network comprising chemical industries have baffled most attempts by experts to provide a short, valid definition of the main divisions of industrial chemistry. The magnitude of all these interests is certainly not wholly reflected in the total of £230 million capital investment referred to in the Report on Chemical Industry, which the Association of British Chemical Manufacturers presented to the President of the Board of Trade at the beginning of the year. That review was intended perhaps to serve as a relatively small cross-sectional view permitting some deductions to be drawn about the whole. It is revealing, and to some perhaps alarming, to observe the indifference to considerations such as this which characterise the kind of proposal with which some trade union officials have made us familiar for making chemical industries another State operated group.

Some inkling of the lack of realism in the grandiose proposals which have been made in the past appears to have conditioned the newest version of the same theme, which was offered to a section of workers in chemical industry at the general meeting in Harrogate last week end of the Chemical Workers' Union. According to this manifesto, this union which shares with several others the representation of organised chemical workers, is still " in favour of the nationalisation of the entire chemical industry but has modified its view to meet the desires of the Labour movement for limited nationalisation."

It appears that the propounders of this policy would be satisfied, for the time being, with something less than the equivalent of the Iron and Steel Act. It asks now that the Government should stretch the powers it has acquired to " extend Government activities into the coal by-product industries . . . to take over the coal tar by-product industries . . . and to establish centres of production for the manufacture of a number of pharmaceutical products and drugs which are in constant demand, arising from the application of the National Health Act." The Chemical Workers' Union itself does not appear to have been invited to express its approval or opposition, since no mention of the proposals is made in any of the 15 resolutions put to the Harrogate meeting.

Perhaps the best claim to attention of the proposals made, almost incidentally, at the Harrogate meeting is the light which they throw on the practical im-

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possibility of procuring anything that could honestly be described as "a mandate" to usurp the functions of management of an industry. The conspicuous fact about this chemical manifesto is that control by a Government board, which is generally what nationalisation involves, appeals about as little to those who agitate for nationalisation as it would to those who condemn out of hand the effect of substituting bureaucracy for business management.

The general secretary of the C.W.U., in a booklet distributed at Harrogate purporting to show why "the chemical industry" should be nationalised and how to do it, presents a point of view which bears so close a likeness to the opposition case that it is difficult to credit that the respective spokesmen are diametrically opposed. Whatever workers in chemical industries feel, the trade union secretary is in no doubt that the mixture already prescribed for some other industries would produce something like paralysis if it were administered to the chemical enterprises. Although it appears to represent the general secretary's own view, which others may or may not share, this verdict on nationalisation deserves recording:—

"The Labour Government seems so far to have failed in thinking out the precise methods of application of an essentially socialist organisation . . . If any intelligent worker employed by one of these existing forms of public ownership" (the BBC, BOAC and others are instanced) "is asked his opinion, invariably those most energetic and imbued with a keen sense of public responsibility will sum up in one word, 'frustration.'"

That, the trade union commentator concludes, is the price which a bureaucracy exacts because Labour Ministers lack understanding of the principles of management and the senior Civil Servants to whom they turn "have no ready fund of experience on which to draw for administration in this vastly different field of industry and commerce."

By a process of reasoning which pays little regard to logic, the obvious conclusion—that the only people qualified to manage chemical industries are those who have been doing it manifestly successfully all their lives—is, of course, not the one to which this kind of argument leads. The answer is indeed much too involved to be summarised, except by saying that it requires "an industrial democracy," decentralisation, producer and consumer councils and, at the top, a policy-making national council sitting in public as "a miniature parliament." Chemical workers may understandably wonder whether their aspirations will influence this miniature parliament any more readily than they have the one in Westminster.

Notes and Comments

An August Trade Record

THE scale of the increases of export shipments of chemicals in August, to make up a total of £9,248,922, constitutes a change for which it would be hard to find a parallel since the war's end. An increase of more than £2.6 million in one month—taking August 1949 as the standard of comparison—cannot be entirely dissociated from widespread anxiety less the peacetime basis of exchange should be demolished by some decisive act of aggression, and the expectation that the British rearmament programme might make inroads upon a good many chemical products earmarked for the export market. If those are in fact the main forces behind this phenomenal upward surge in chemical sales the readiness of practically every buying country to forestall events is almost as arresting as the effect on the total. A list, by countries, of export sales of chemicals of all kinds, including drugs, dyestuffs, colours and so on, reveals that almost every large buyer has taken substantially increased shipments than were required in August last year. Should this sudden rise in demand for British chemicals not be long maintained at the present record level there will still be grounds for solid satisfaction in the windfall in American currencies and the absence of any evidence that the home trade has been deprived. The American accounts for August 1949 and August 1950 show, for example, totals like these: U.S.A., £60,400 : £480,143 ; Canada, £126,792 : £314,285 ; Colombia, £6385 : £56,443 ; and Mexico, £8859 : £33,104. Ability to continue to serve the world and home users on such a scale would dispose of any doubt about the progress of "productivity" in basic chemicals.

Revealing Comparisons

THE exceptionally large share borne by chemical products, in relation to normal commodity ratios, in narrowing the dollar deficiency will not have passed unnoticed by American chemical industries. Their expressions of concern earlier this year, mild as they were, will seem to have little relation to the facts to any one who pauses to contrast the sum of our chemical exports with the vast and growing total of American chemical production. An impressive, if circuitous, method of relating August's record total exports of U.K. chemicals with America's capacity as a purchaser is suggested by one of the things said in Glasgow last week by the American Consul-General, Mr. Dayle C. McDonough. Applauding the recent increases in shipments to the U.S.A. of products such as iron and steel manufactures, machinery and cresylic acid—which, as Sir Cecil Weir, chief of the Dollar Export Board, disclosed on Tuesday, have helped to halve the dollar gap—the U.S. Consul-General gave a revealing comparison. British exports of all kinds to the U.S.A. are equivalent to about 11 per cent of the total sales of one leading American mail order concern—Sears Roebuck & Company. Similar comparisons can be multiplied: chemicals accounted for only about 1.5 per cent of the record total to the U.S.A. in August. It would not seriously have upset the accountancy of one of those giant American retail organisations, much less the total of American chemical output. The scale of that may be judged from the fact that its export surpluses alone produced $182 million in three months this year.

Concessions to Western Germany

ONE of the most suggestive results of the "liberalisation of trade" agreements and the recent ratification of the European Payments Union agreement is the freedom to be accorded to Western German industries in the U.K. markets, as from Tuesday this week. These concessions permit the import without individual licence of a wide range of goods from most OEEC and many other soft-currency

countries. At present there exists no separate schedule of chemicals or scientific instruments to be imported without restriction from Western Germany, but the extension of the concessions there clearly opens up the possibility of considerably increased competition from German industries. British interests are well advised in watching very closely what emerges from this new facility for Germany to widen the field of low-price commercial policy. All the European markets of the 18 countries concerned will now be wide open to the Germans, as they have frequently been to other producers who have been able to undercut Britain. The influence of import quotas was in the past the principal safeguard against the price-cutting policies of countries in which labour was cheap or production costs were indirectly subsidised. One expert view expressed this week affirms that Germany "will undoubtedly get going" in pressing sales of commodities such as glass and scientific instruments. Much will depend upon just how much control in the German economy is retained by the Allies. All recent indications are that that will soon be a negligible quantity.

Revaluing the Chemical Engineer

THE suitability of chemists and chemical engineers for what are called executive positions—a well-worn theme—gained a new lease of life at the recent corporate meeting of the American Institute of Chemical Engineers. The American fraternity rather naturally had no doubts that the chemical engineer, at least, has an essential rôle to play in directing, and not merely facilitating, industrial processes and the growth of industries. A testimonial of that was given by Mr. L. A. Hatch, vice-president in charge of research of the Minnesota Mining & Manufacturing Company, who affirmed that the training and background of chemical engineers made their guidance invaluable to financial interests and their skill was the means of creating new jobs and new and better products at low prices through the efficient application of technology. The habit of leaving the chemical engineer outside the board room is considered to be losing ground in the U.S.A. Mr. L. P. Scoville, production manager of the Jefferson Chemical Company, who confirmed this at the Minneapolis meeting, believed that the fuller recognition of the chemical engineer lies in the immediate future. He made the interesting point: "Chemical engineering is such a new profession that only recently have there been chemical engineers of sufficient age and experience to qualify for top executive positions." American industry is being taught that the growing ranks of chemical engineers, whose increase is unfortunately much more marked there than in this country, may have a surprisingly profitable influence if they are not treated merely as a new recruitment of good technologists.

Good Prospects for Plastics

THE dependence of the plastics industry on the availability of raw materials, and the need for a continued policy of long-term research, were the keynotes of the advice given by the chairman, Dr. R. G. Heyes, at the meeting in London this week opening the new session of the Plastics Institute. Dr. Heyes, considering the relationship between chemical industry and plastics, indicates that the latter may look for great benefits in the near future from the vast capital at present being expended by the oil industry on its cracking plants. The plastics industry, however, could not survive without expert teams of scientists working in collaboration—the chemist, physicist, chemical engineer and technologist. All are essential. Chemical industry now can make a material to suit almost any requirements, but mechanical methods of manipulation must keep pace. It is up to the chemical engineer to supply the plant, and to the plastics manufacturer and plastics fabricator to understand each other's problems.

Petrol Prices

Shell-Mex and B.P., Ltd. have announced an increase of ¼d. per gal. in the prices of motor spirit and industrial spirits, with effect from September 22.

FELT INDUSTRY RESEARCH

Full Equipment for Fundamental Study Programme

THE new premises of the British Hat and Allied Feltmakers' Research Association at Stanley House, Fairfield, near Manchester, were officially opened on September 19 by Lord Derby. The association was formed in 1947 for carrying out fundamental and applied research on behalf of the hat and allied feltmaking industries and ancillary trades, and its membership includes wool and fur felt hat manufacturers, fur cutters, and manufacturers of ribbons, dyestuffs and machinery.

Stanley House, bought for £2280, and converted at a cost of £10,000, comprises laboratories for physics and chemistry and an information section, devoted to fundamental and applied research concerning raw materials, felt manufacture, and new developments in the use of felt. The staff includes eight qualified scientific and technical workers, six assistants and four clerical and administrative workers. The director of research is Dr. T. Barr.

The main chemistry laboratory is equipped with fixed sectional work benches and side benches for special apparatus.

When particular atmospheric conditions are required, the experiments may be conducted in the testing laboratory.

The work is financed jointly by the industry and the Department of Scientific and Industrial Research.

Dr. T. Barr told the Press at a conference prior to the opening that in its fundamental research work, the association hopes to find answers to some of the problems concerning the mechanism of felting and at the same time contribute to the sum of knowledge on animal fibres. This research, carried on without regard to immediate requirements, would form a fund of knowledge which would help in solving various problems met by the industry.

Part of the chemistry laboratory. With the director of research (right) is Lord Derby

Sulphuric acid was largely used in the industry but in addition there was the problem which was being considered of chlorinated noils from the wool industry which, if they were allowed to pass through undetected, caused endless trouble because of their inability to felt. This was another problem for research.

Steel Display Cancelled

BECAUSE of the prospect of nationalisation of the industry, the British Steel Federation has cancelled the space reserved for it at the Berlin International Industrial Exhibition which opens to-morrow (October 1). The British pavilion was planned as a composite display of 10 windows. Efforts are being made to fill the vacant site with some other form of British industrial display. Among the British products on view elsewhere will be leather, cotton and wool goods, glass, pottery, books, etc.

B

Gas Strike Halts Production

INTERRUPTION of output and considerable losses by non-ferrous metal producers and fabricators in the London area are among the effects produced this week by the progressive reduction of gas supplies caused by the continued strike of some 1500 gas industry engineers. A telegram to the Prime Minister by Mr. N. D. Robertson, managing director of the Non-Ferrous Die Casting Company, in North London, recorded that 31 of the 48 gas furnaces operated there were out of action and the firm might have to close down.

CHEMICAL EXPORTS AGAIN EXCEED £9M.

Large Increases in Ammonium and Sodium Compounds

THE high level of exports secured by British chemical industries in July was well maintained in August. The total value, including drugs, dyes and colours, amounted to £9,248,922, compared with £6,594,864 (1949) and £9,319,269 in August.

Outstanding values were: ammonium sulphate £645,253 (£298,614); ammonium nitrate £103,281 (£48,930); all other ammonium compounds £80,297 (£49,868); sodium carbonate £270,848 (£92,611); caustic soda £417,070 (£201,108); bleaching powder £30,965 (£8,737); copper sulphate £219,294 (£103,047); tar oil, creosote oil, anthracene, etc. £193,783 (£79,676).

Non-ferrous metals exports were valued at £9,165,327, compared with £4,649,865 in August, 1949, mainly because of the increase in tin exports, which totalled £2,337,686 as against £86,990.

	August, 1950	August, 1949
	Gal.	Gal.
Cresylic acid	276,255	107,833
	Lb.	Lb.
Salicylic acid	98,819	180,466
Value of all other sorts of acid	£157,639	£122,709
	Tons	Tons
Sulphate of alumina	2,849	3,390
All other sorts of aluminium compounds	554	551
Ammonium sulphate	32,995	15,707
Ammonium nitrate	3,743	1,740
All other sorts of ammonium compounds	2,176	1,336
	Cwt.	Cwt.
Bleaching powder	28,334	8,373
All other bleaching materials	12,321	10,299
Collodion cotton	1,578	1,920
	Tons	Tons
Copper sulphate	4,217	2,442
	Cwt.	Cwt.
Disinfectants, insecticides, etc.	53,909	43,786
	Tons	Tons
Fertilisers	2,159	1,072
Value of gases (compressed, liquefied or solidified)	£35,545	£26,357
	Cwt.	Cwt.
Lead acetate, litharge, red lead, etc.	10,268	4,981
	Gal.	Gal.
Tetra-ethyl lead	100,141	76,436
	Tons	Tons
Magnesium compounds	876	601
	Cwt.	Cwt.
Nickel salts	6,378	5,779
Potassium compounds	6,962	6,033
	Tons	Tons
Salt	24,812	21,053
	Cwt.	Cwt.
Sodium carbonate	514,543	170,453
Caustic soda	353,239	187,467
Sodium silicate	20,091	15,008
Sodium sulphate	72,007	47,783
All other sodium compounds	97,877	78,116
	Gal.	Gal.
Tar oil, creosote oil, anthracene oil, etc.	3,612,009	1,917,935
	Tons	Tons
Zinc oxide	1,170	991
Total value of chemical manufactures (excluding drugs and dyestuffs)	£5,463,330	£3,317,883
Value of quinine and quinine salts	£23,886	£36,564
	Lb.	Lb.
Acetyl-salicyclic acid	230,028	63,594
	100 International Units	100 International Units
Insulin	1,404,986	2,199,070
	Mega Units	Mega Units
Penicillin	1,319,995	697,546
Total value of drugs, medicines, and preparations	£1,840,402	£1,521,733
Total value of dyes and dyestuffs	£724,901	£867,242
Total value of paints, pigments, and colours	£1,220,289	£888,006
Total value of chemicals, drugs, dyes and colours	£9,248,922	£6,594,864
Total value of all plastic materials	£792,235	£456,497
	Cwt.	Cwt.
Chemical glassware	1,101	1,086
Value	£42,248	£52,462
	Cwt.	Cwt.
Fans	5,711	3,786
Value	£147,503	£101,365
	Cwt.	Cwt.
Furnace plant	15,366	3,742
Value	£166,197	£58,847
	Cwt.	Cwt.
Gas and chemical machinery	19,486	26,350
Value	£204,255	£273,257
Scientific instruments: optical	£91,143	£83,932
Value		
Thermometers, mercury in glass instruments, etc.	£42,439	£37,220
	Cwt.	Cwt.
Air and gas compressors and exhausters	17,642	10,774
Value	£359,293	£228,418
Non-Ferrous Metals	Cwt.	Cwt.
Aluminium and aluminium alloys	102,375	103,028
Value	£1,198,014	£1,217,301
	Lb.	Lb.
Bismuth metal (not including alloys)	58,374	76,506
Value	£39,940	£39,385
	Cwt.	Cwt.
Brass and other alloys of copper, other than nickel alloys	74,912	92,336
Value	£933,768	£858,137
	Tons	Tons
Copper	9,484	8,408
Value	£1,935,940	£1,271,834
	Tons	Tons
Lead, unwrought, sheets, etc.	6	13
Value	£775	£1,360
	Cwt.	Cwt.
Nickel and manufactures of	20,923	16,867
Value	£447,218	£254,568
	Cwt.	Cwt.
Nickel alloys	7,331	5,022
Value	£207,061	£109,951
	Tons	Tons
Tin unwrought	3,362	157
Value	£2,337,686	£86,990
	Lb.	Lb.
Tungsten (except ferro-tungsten)	22,911	25,107
Value	£22,618	£32,425
	Tons	Tons
Zinc	422	354
Value	£81,385	£50,301
Total value of group	£9,165,327	£4,649,865

MECHANISATION IN METAL INDUSTRY

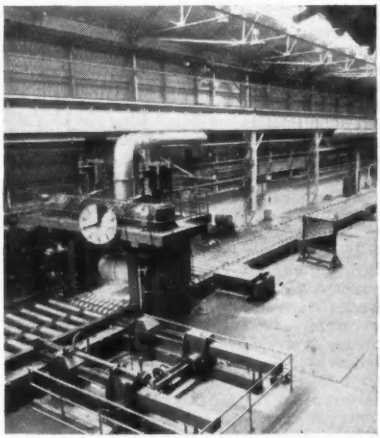
High Output of the New Aluminium Mill

THE installation described as the most efficient continuous type mill engaged in the rolling of aluminium outside the U.S.A. was inaugurated last week by the Minister of Supply (Mr. G. R. Strauss), at Rogerstone, Monmouth. It had just been brought into production by the Northern Aluminium Co., Ltd.

An increase of 35 per cent in the country's aluminium sheet rolling capacity is expected to result from the operation of this plant, whose output capacity is 50,000 tons of sheet and strip aluminium per annum.

The mill, erected at a cost of about £3.5 million, can be operated at speeds more than four times as fast as those of other systems, it is claimed. This will be the main source of the five-fold increase in production which it is expected to achieve without a corresponding increase in labour requirements.

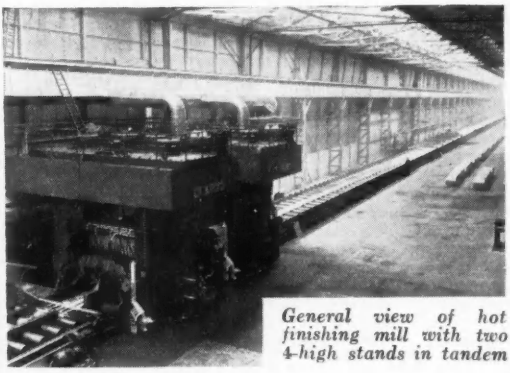
The decision of the Northern Aluminium Company to build this extension to its Rogerstone works—which was then believed to be the largest aluminium fabricating unit in Great Britain—was governed by two main factors. The transition from the abnormal demands of wartime production to the more competitive conditions made it evident that to maintain the advances of the past few years in the aluminium industry, and at the same time establish new markets, would require a new approach to the cutting of production costs. This has, apparently, been done by the use of the most up-to-date equipment and production methods.



Photographs by courtesy of The Northern Aluminium Co., Ltd.

Part of the hot line, one-third of a mile long; in the foreground is the breaking-down mill

The chief products of the mill are container sheet, corrugated sheet and building sheets of all kinds. The firm thus aims to introduce aluminium into fields where it has not up to the present been used on a large scale. Aluminium foil insulation—expensive, but economical—has been used in the works buildings to keep them cool in summer and warm in winter. By this method the thermal requirements for space-heating plant are stated to have been reduced by one-third, and the saving in capital cost of the heating plant will, it is estimated, pay for about 60 per cent of the cost of insulation. The production layout includes the hot-rolling line, extending nearly a third of a mile, where ingots weighing nearly two tons are heated to 400°-500° C.; high-speed cold-rolling mill, from which strips are ejected at speeds up to 2000 ft. a minute; reversing mill; trimming, cooling and coiling machines, and finishing equipment.



General view of hot finishing mill with two 4-high stands in tandem

Safety Programmes in Chemical Plants

Means of Economy in Insurance Charges

THAT it pays dividends, in effect, to develop as highly as possible accident prevention methods in chemical and other industrial plants—in addition to the even stronger recommendations—is demonstrated by the procedure adopted by the industrial insurance companies in this country in assessing premiums for certain risks in particular establishments.

The assessment of these premiums generally is based on the principle that they will be lightened in recognition of a diminution of risk rather than because of a reduction of the number of accidents.

This contrasts with the practice in the U.S.A., where insurance is a very complex business and entirely competitive. The circumstances surrounding the granting of a premium rebate of more than £30,000 to an American chemical manufacturing concern (THE CHEMICAL AGE, *53*, 425) have no parallel in this country.

Here, an insurance company's expert surveyor visits a particular plant, prior to issuing insurance against accident risks, and the premium is fixed on what he reports having found there. Such reports are concerned very largely with the potential risks involved in particular processes, and in some cases the storage of dangerous materials. Particular importance is attached to the measures employed to combat those risks.

Adjustment of Premiums

Although insurance procedure in Britain is non-competitive, companies generally adopting the same methods of assessment and frequently arriving at identical results, there is no such thing, in practice, as a flat rate for a particular risk, and none of the bigger companies gives a "no claims" bonus on this class of business. It is understood, however, that one or two of the smaller insurance companies do effect "accident cover" on the principle of a plant's claims being consistantly below a certain figure, but this is by no means a general practice.

The reverse aspect of this subject was provided, in recent years, by one chemical firm, which had had a comparatively large number of accidents of varying severity since its insurance was first effected. Its original premium was increased by the broker concerned. This, however, can happen only very infrequently, in view of the thorough and expert surveying of a plant's risk by the insurance company.

The closely related fire hazard is handled here by two classes of companies—"tariff" and "non-tariff." The former fix their premiums on the report of their surveyor on apparent risks and prevention methods practised. The non-tariff companies drive the best bargain—or "make the best risk"—they can, but the result is usually very nearly the same.

Payment of accident claims for personal loss and injury is nowadays effected through the working of the National Health Insurance Act, in instances in which no fault can be assigned either to an individual or a firm, the Workman's Compensation Act having been virtually dead for two years. In other cases, it is open to the victim of an accident to take common law action against the employers.

European Chemicals Proposal

THE national executive committee of the Chemical Workers' Union was the sponsor of a resolution approved at the annual conference of the union at Harrogate last week calling for "the co-ordination of European chemical industries in the interests of world peace and full employment." It urged that the Government should promote a conference in London "for the establishment of a Chemical House of Europe." Among the 17 objectives of such a conference, it is suggested, would be the co-ordination of these activities in Europe:—

Research relating to atomics, chemicals, pharmaceuticals, biological questions, and medicines; marketing; exchange of teachers and research workers; exchange of surplus outputs; price stabilisation; European patent licensing system; exchange of information; progressive reduction of duties and tariffs; the exchange of basic products such as carbide, petroleum, salt, sulphur and coke; the establishment in the U.S.A. of European Houses of Chemicals to organise sales in the dollar area.

Methanol Mishap

No danger was offered, it was reported on September 22, from the 2500 gal. of methanol which spilled from an overturned road tanker at Acton Bridge, Cheshire, on the previous day. Cheshire County firemen "broke up" the spirit with water, with which methanol is miscible.

EFFICIENT USE OF COAL

Methods to Defeat Smoke-Fog Hazards

AN authoritative survey by Dr. D. T. A. Townend of the new scientific study of coal and its uses formed the starting point of the annual conference in Margate (September 27-29) of the National Smoke Abatement Society. His paper "Towards the Better Use of Coal." was the first of a new series of annual Des Voeux Memorial Lectures, inaugurated to honour the society's first president, Dr. H. A. Des Voeux.

Dr. Townend recalled that the scientific study of coal was a quite recent development, and he outlined how an understanding of coal's complex structure was being sought by the analyst, the geologist, and the physical chemist. He described how Dr. Seyler, now in his 80's but still active at the research laboratories at Leatherhead of the British Coal Utilisation Research Association, had discovered in coal nine different components, and how he had devised a technique for measuring the different proportions of each in different samples of coal, thus enabling coals to be identified and classified.

The work of the physical chemist in the study of the highly complicated internal structure of coal was described: work which has important bearings on practical problems of combustion and the use of different kinds of coal for different purposes. Dr. Townend gave a description of the intricate changes that take place when coal is burned, noting that it had recently been found that less smoke was formed if inert gases, such as nitrogen and carbon dioxide, were passed through the fire. These gases are present in the flue gases, and a reduction in smoke is observed when they are recirculated with the air supply to the fuel bed of the fire.

Down-jet Combustion

Progress in the development of the new down-jet principle of combustion was described. In this, instead of air for combustion flowing up through a relatively thin fire, it is forced down, as a jet, at an angle on to the surface of a much deeper mass of fuel. While further industrial development of this principle is necessary, there are already a number of units burning coke that have been successfully installed in industry.

A relatively new and important development, Dr. Townend considered, was concerned with the efficient use of small coal as source of energy for gas turbines. Experimental work on this is in progress, in which the British Coal Utilisation Research Association was collaborating with the Fuel Research Station of the Department of Scientific and Industrial Research.

Dr. Townend showed how smoke from coal was being reduced by improvements in practice and technology, and by the wider and more rapid application of science to fuel problems. The nationalisation of the great fuel industries, coal, gas and electricity, was an important factor, for although in the past these industries included many units with high standards of technical efficiency, the opportunity for those standards to become general was not great. "Organisation of these industries on a national basis," said Dr. Townend, "should enhance the prospect of lower technical standards being raised and of the whole of each industry becoming more rapidly responsive to new technical and scientific advances."

Small Expenditure on Research

Commenting on the smallness of the nation's expenditure on coal research—£1 million a year, or 1¼d. per ton of coal—Dr. Townend pointed out that this is roughly equivalent to the aggregate cost of one cigarette every four months per head of the adult population. "This position calls for serious thought" he said, "particularly in view of the importance of coal research in all its aspects to our present internal economy."

Medical Aspects

The conference heard several expert contributions discussing the domestic aspects of coal burning and the objectives which were to be pursued in the "new towns." The aspect of smoke-fog and lung diseases was then discused by Dr. J. S. G. Burnett, Medical Officer of Health for Preston, who mentioned serious incidence of deaths by smoke-fog poisoning and also examined cases of increased mortality in this country following smoke-fogs, citing examples from Glasgow and London.

It is clear, said Dr. Burnett, that the acute respiratory distress caused during smoke-fog is a general reaction to irritation, varying with the amount of irritant present in the air, the duration of exposure, and the previous physical condition of affected persons. "Hence severe distress may be caused and death among those already suffering from chronic cardio-respirator disease." Dr. Burnett then

went on to point out that between the extremes of complete recovery and death there are sufferers left with a residual defect that must make them less able to withstand subsequent attacks on the respiratory system. Because resistance varies so much from person to person there is no intensity of pollution below which it can be said that no harm would be done, and the only solution to the problem lies in the continuous application to measures to eliminate atmospheric pollution as far as possible.

Apart from the smoke-fog effects described by Dr. Burnett, which have a limited duration, there is always some pollution present in the air which may have some effects over a long period. Since some of the finer particles inhaled are retained in the lungs, their effect might well be cumulative.

Cumulative Effect of Smoke

This was stressed in the second paper of the health session, by Mr. R. E. Waller, of the Department of Pathology at St. Bartholomew's Hospital. He referred to the increase in deaths from cancer of the lung in recent years, especially in the towns, and to the conclusion reached by Dr. P. Stocks, of the General Register Office, that either smokiness of the air is an important factor in producing cancer of the lung, or sunshine (reduced by smoke) is an important factor in preventing it.

Examination of samples of town smoke has shown that some substances known to have carcinogenic properties are in fact always present in trace amounts. Arsenic is one, 3:4-benzpyrene another and radioactive material a third. Arsenic is present in some coals, and part of it is emitted with the smoke. 3:4-benzpyrene is a well-known constituent of coal-tar and some lubricating oils, and occurs in domestic soot (Goulden and Tipler, 1949). It has also been detected in the small amount of smoke emitted under certain conditions from the exhausts of internal combustion engines.

Radon Decay Products

The traces of radioactive material normally found in the atmosphere consist of the short-lived decay products of radon, derived from natural sources in the ground. While the origin of these has nothing to do with smoke, they do attach themselves to smoke particles in the atmosphere. The carcinogenic action of such material has not been directly established, but its possible effect should not be overlooked.

Daily smoke filters, as run by some local authorities, provide suitable measurement, and are taken for analysis in batches of one month or more. The tarry matter in the smoke deposited upon them is extracted with acetone, and the complex mixture of hydrocarbons thus obtained separated as far as possible by chromatography. A solution is finally obtained containing a few micrograms of benzpyrene, together with some impurities difficult to remove. The benzpyrene is detected by means of its fluorescent spectrum, and its amount estimated by comparison with a standard. From the data supplied by the collecting authority, the total volume of air from which that amount has been drawn, and an estimate of the weight of smoke collected, are known. Hence the concentration of benzpyrene in the air, and its proportion by weight in the smoke collected can be calculated.

During a fog, the same atmospheric contaminants are still being emitted at the same rate, and accumulate at a low level. An example of the effect of this on benzpyrene concentration is shown in the results quoted in the table. The month cited showed a rather high average smoke concentration, and included three consecutive days of fog, referred to as Z-days (smoke conc. 1.25 mg./m³), the papers from which were selected for separate estimation.

Benzpyrene in smoke: Station B.

Period	February, 1949			February, 1950
	3 Z days	25 other days	All 28 days	All 28 days
Smoke conc. mg./m³	1.73	0.40	0.55	0.44
Benzpyrene conc. mg./100 m³. ...	32.8	7.2	9.8	6.4
Benzpyrene in smoke p.p.m.	190	180	180	150

Effect of Weather Fluctuations

The average benzpyrene concentration during the three Z days rose to over four times that during the remaining twenty-five, giving a whole month average 36 per cent higher than the latter, and 53 per cent above that for the corresponding month in the following year.

This illustrates the way in which certain weather conditions may cause irregular variations in the benzpyrene concentration from month to month, or year to year. The result that the proportion of benzpyrene in the smoke rose but little during the three Z days as compared with the rest of the month shows that the fog produces a change in quantity rather than quality of the suspended matter.

Whether or not the amount of benzpyrene reaching the lung is substantially raised during fog is another matter, as the particle size distribution is likely to be different under such conditions.

FURAN RESINS

High Resistance to Corrosive Action

BECAUSE of their good resistance to acids, alkalis and solvents, newly developed furan resins are finding increasing application, mixed with suitable fillers and setting agents, for making acid-proof mortar for acid-proof brick and tile installations. The U.S.A. at present leads in this sphere. This resin is the ideal cement for use in the installation of acid-proof brick floors, which are often subjected to strong alkali cleaners. It is also used for sewers, drains and masonry linings in industrial equipment which alternately handles strong acids and alkalis. Furan resin cement is suitable for acid recovery systems, chlorinators, digestors, dye vats, neutralising tanks, pump bases, receivers, and so on.

In the metal plating industry use is being made of the resin in building and repairing plating tanks, cleaning and pickling tanks, floors, gutters and neutralisation pits, also in electrolytic vessels and sewers which disperse corrosive effluents. Many other industries handling acid or alkaline liquors, such as pulp and paper mills, oil refineries, glass works, dye factories and rayon works, also make use of furan resin cements.

Furan resins can be used directly on dry wood surfaces and will adhere firmly to the wood fibre. When applied to the wood, the resin sets hard and thus effectively seals all joints and cracks. In works practice the resin cement is generally applied with a trowel and reinforced with chemical glass cloth to prevent shrinkage.

Primers Required

Portland cement must be neutralised before furan resin cements can be applied satisfactorily and steel requires to be coated with a primer or lined with rubber before treatment with furan resin. The presence of the primer or rubber accommodates the difference in expansion and contraction between the resin and steel. The resin adheres firmly to unglazed brick and tile.

Furan resin cement sets by internal chemical action, promoted by an added catalyst or accelerator, to produce a tough, durable coating or bond which is highly resistant to abrasion, impact and shock. It is dense and non-porous and has excellent adhesion to many different surfaces. Commercial furan cements set hard after 24 hours and at 70° F. remain easily workable for 90 minutes; at 80° F. the working time of the cement or mortar is reduced to approximately 20 minutes and the hardening time to 12 hours.

Most chemicals are safe in contact with furan resin but important exceptions are aniline, aqua regia, bromine, cresylic acid, hydrogen peroxide (over 30 per concentration), iodine, nitric acid, concentrated chromic acid, pyridine and sodium hypochlorite. Such corrosive chemicals as 85 per cent acetic acid, phosphoric acid (70 per cent concentration), sulphuric acid (50 per cent concentration), hydrochloric and hydrofluoric acid, etc., are all without effect on furan cement up to 280° F.

The resin has a compressive strength of 12,000 p.s.i.; water absorption of 0.5 per cent by weight and modulus of rupture of 1500 p.s.i.; coefficient of expansions for the American Permanite material per degree F. is 6.1×10^{-6} and the weight per cubic foot of resin mortar is 95 lb.

Resinification Promoters

Many patents have been taken out to cover methods of making cements and coating compositions from furfuryl alcohol and its derivatives. For example, U.S. Patent 2,095,250 discloses a method for producting an acid and solvent resistant coating comprising reacting furfuryl alcohol or a mixture of furfural and furfuryl alcohol with a promoter for resinification (e.g., sulphuric acid in a solution of diacetone alcohol) to obtain a soluble resinous condensate.

U.S. Patent 2.174,886, taken out by E. F. Kiefer, describes a method of making a plastic resinous cement by treating furfural, furfuryl alcohol or mixtures of these compounds with 5 to 10 per cent by volume of a catalyst, for resinification.

A patent taken out by H. F. Lewis (U.S. Pat. 2.267,830) covers a method of making a coating preparation by heating furfuryl alcohol mixtures with a mineral acid in the presence of an acetone solution of the powdered co-polymer of vinyl acetate and vinyl chloride. This forms a strong corrosion-resistant coating for laboratory table tops.

According to U.S. Patent 2,366,049 an acid- and alkali-proof cement can be made by modifying furfuryl alcohol with polyvinyl butyral, polymethyl methacrylates, etc. Generally, the black resin made by heating the alcohol with mineral acid possesses a high degree of resistance to solvents as well as to acids and alkalis.

WEED CONTROL ON THE RAILWAYS

Mechanised Methods of Chemical Treatment

by ERNEST A. DANCASTER, M.Sc., Ph.D., F.R.I.C.

THE importance of weed control on agricultural land and in gardens is universally recognised. Much less is heard of the need for the same preventive work on railway tracks, although this control is quite as necessary and the magnitude of the task and the requirement of chemicals are comparable with those of agriculture.

A weedy track is not only offensive to the eye but suggests laxity of management. These, however, are minor considerations compared with the harm weeds do if they are not destroyed periodically. Unrestricted growth soon causes the ballast to become choked and clogged with decayed organic matter, accumulated soil, and detritus, seriously interfering with the drainage of the track. This accumulated matter accelerates decay of sleepers and other woodwork and the corrosion of metal work. In the tropics, the track soon becomes obstructed by plant growth, except in arid regions, and even in Britain the lines may become seriously overgrown in little used sidings or tracks where traffic is intermittent.

THE Railway Executive states that British Railways today are operating over 19,631 *miles of route, which involves the upkeep of* 52,235 *miles of standard gauge track—double and multiple main lines, sidings and station equipment. British Railways' weed-killing programme in* 1950, *most of which was carried out this Spring, will consume* 4838 *tons of chemical weed killer, principally sodium chlorate. This will supply about* 1 *million gal. of solution.*

Weeds spread by seeding and also vegetatively by underground stems, and the latter, such as the twitch grasses, creeping thistle, etc., are the most difficult to eliminate. Plants occurring on the track vary considerably in different parts of the country, but some widely distributed species form the principal problem on all British railways. Most frequently met in the South of England are these:

Marestail (*Equisetum arvense*), creeping thistle (*Circium arvensis*), field convolvulus (*Convolculus arvensis*), coltsfoot (*Tussilago farfara*), millefoil (*Achillea millefolium*), dock (*Rumex*), various species and hybrids; dandelion (*Taraxacum officinale*), scentless mayweed (*Matricaria inodera*), groundsel (*Senecio vulgaris*), chickweed (*Stellaria media*) and various grasses.

Species of hawksbit (*Leontodon*), ragwort (*Senecio squalidus*), and black nightshade (*Solanum nigrum*) are common locally, and seedling trees may be troublesome, especially those kinds which have winged fruits, such as the ash. Marestail is extremely difficult to kill, but many other plants, such as the creeping thistle, couch grass, and other twitch grasses, are almost as resistant. For many years all essential elimination of weeds was carried out on the railway systems by the slow and costly method of hand weeding. The plants were often chopped off, leaving the roots in the ground, but owing to the longer hours and lower pay then obtaining the method was considered sufficiently economical and satisfactory. Many factors rendered hand weeding impracticable including rising cost of labour and, in some cases, electrification of the lines. The whole question of weed control had to be reconsidered.

Mechanical Methods

A choice of means was available, because in some tropical countries rapid plant growth had long before led to the introduction of more efficient methods. The railways of the U.S.A., the Dominions, and Europe had also experienced serious trouble with weeds. Mowers of the reciprocating type driven from a motor mounted on a trolley are used in America. Burning with heavy duty weed burners is also practised, a light scorching damaging the epidermis of the weeds without setting fire to the sleepers or injuring the ballast. Discing and harrowing, steaming, and chemical treatment have also been used. In Great Britain, however, effort has been confined to the use of chemical means except for minor experimental purposes.

The chemical control of weeds was at first carried out in a somewhat haphazard manner, but the trials made with known and possible weed killers and primitive improvised apparatus gave such good results that special weed killing trains were built.

There were, of course, many kinds of weed killer on the market already in use for agricultural and garden purposes, but

most of these were of little use on the railway. The many organic and inorganic weed killers which vary considerably in their action on different species of plants were not adapted to the total destruction required by the railways. A more general herbicide is required, and there should also be a soil sterilant, as fresh supplies of seeds are constantly brought to the track by wind, animals, and on the boots of the men working on the line. Plants with creeping stems constantly penetrate the track from either side of the line. Complete and permanent sterilisation has not, however, been attained and probably never will be.

One of the most effective weed killers is arsenic, either in the form of the trioxide, As_2O_3, or as sodium arsenite, Na_3AsO_3. Arsenic, however, is much too dangerous to be suitable for use on railways. All appreciably poisonous materials must, in fact, be ruled out, because of the danger to the men applying them, to others working on the track and possibly to cattle feeding near the line.

Conventional Herbicide Retained

The most effective substance is still sodium chlorate, used either as a powder or in solution. Although showing some selectivity it is a fairly comprehensive herbicide. Sterilisation of the soil is not complete, but an appreciable cumulative effect is evident after repeated applications. It has been remarked that nettles and some other plants appear to recover for a time after an application but they die out the following season, although no further applications may have been given.

It is very desirable to spray before the seeds ripen, in this country, usually during May and June. In Germany, spraying is done in April to reduce the risk of the dead weeds catching fire, a necessary precaution because of the nature of the solution used.

The fire risk enforced abandoning the use of approximately pure sodium chlorate. A mixture of sodium chlorate and soda ash was introduced on the Great Southern Railway of Ireland in order to lessen the risk. In Britain the chlorate was at first obtained from France in the preparation known as Occysol. It consisted essentially of a mixture of over 90 per cent sodium chlorate and about 7 per cent sodium fluoride, but to reduce the risk of fire the composition was modified. A sample which I examined in 1932 contained:

Sodium chlorate	64.80 per cent
Sodium chloride	27.27 per cent
Sodium fluoride	7.12 per cent

Even this reduced strength proved too dangerous and safer materials were sought. The weed killer adopted for general use on the four big railway systems is a mixture of sodium chlorate and calcium chloride in aqueous solution, a small amount of sulphuric acid being added in order to bring the acidity of the solution to about *p*H4, that is to approximately that of the sap, which ranges from *p*H3 to *p*H4.5. The concentrated solution obtained as the proprietary article, Atlacide, is almost as effective as pure sodium chlorate and is practically free from fire risks because the calcium chloride prevents the salt from becoming too dry.

Mobile Spraying

The control of weeds on railways may be divided into three sections:—

(1) Treatment of main and branch lines, large sidings, and marshalling yards.

(2) Treatment of small goods yards, sidings, and short single lines such as those leading to collieries or quarries.

(3) Treatment of approach roads, platforms, cable routes, etc.

The weed control of the track, large sidings, and marshalling yards is carried out by weed-killing trains designed and built for the purpose.

The spray is atomised through specially designed nozzles at pressures varying from 15-40 p.s.i. Atomisation at a greater pressure than this is undesirable as it may cause the spray to blow away. The range employed, however, is wide, a pressure varying between 25 and 30 p.s.i. being the ideal. Some railway companies have designed their own nozzles, those used on the British Railways system which was the LMS being self cleaning. The Southern, Western, North Eastern groups and LPTB all use nozzles which give a cone spray and are reasonably free from obstruction, used in conjunction with suitable strainers.

Here, and in Canada, weed killer is supplied in concentrated solution 1:2 to 1:5, which obviates the need to dissolve the dry salts during the spraying operation, a cumbersome and somewhat dangerous method which is practised on some foreign railways. The dilution with water of the liquid concentrate, carried in tank wagons or tenders, is aided by compressed air or steam from a sparge pipe on the bottom of the tender, or by paddles driven by petrol motors. The L.M.S. method is to carry the concentrate in a tank on top of the tender, from which it is run into the water below, and the mixture is then pumped around by a petrol-driven pump.

In the more highly mechanised method developed on the Southern Railway, the

water and concentrate are carried in separate tenders and are mixed by two pumps geared in the ratio 3:1 driven off the axle, which pumps them into the mixing chamber. The diluted solution passes straight to the nozzles, thus avoiding the necessity of taking on large quantities of water at night, when weed killing is done. This is an important point on an electrified railway system. The output per mile of pumps geared to the axle remains constant over a wide range of speeds and satisfactory atomisation can be obtained at 10 m.p.h. Various valves and nozzles have been designed to keep the pressure constant at varying speeds and constant output. On the Southern railway system an auxiliary engine is also employed for spraying sidings and marshalling yards.

Certain precautions are necessary when spraying "live" electrified lines; the equipments are earthed, and, in the Southern and LPTB regions, the additional precaution is taken of shutting off the nozzles over the live rail.

Strength of Solution

The concentration of the solution, as sprayed on the track, varies considerably on the different railways. The number of gallons per mile ranges from 165 to 420. This is equivalent to about 100 to 200 gallons per acre, and is, therefore, comparable with the amounts sprayed for agricultural purposes. The speed of the trains while spraying varies from about 15 to 35 miles per hour, and the number of miles sprayed per day from 12 to 100; in the Southern region it ranges from 70 to 90.

Small equipments which can be mounted on a platelayers' trolley are used for the treatment of small goods yards, sidings, and small single lines. The Great Western Railway developed an improved assembly in which a tank of 400 or 500 gall. capacity is mounted on the platelayers' trolley and the pump is driven from the axle by means of a chain, the whole equipment being towed by a petrol driven trolley.

Cable routes cannot be sprayed by the weed killing train because they are not placed at a fixed distance from the rails. It was therefore necessary to devise other methods. The weed killer is applied dry, a special sand being used as the vehicle for the herbicide. The mixture is put up in 3½-lb. tins with perforated lids for sprinkling the contents by hand. The tins are packed in cardboard cases, each containing 12 tins, sufficient to cover approximately 400 sq. yds. No mechanical dry sprinkling machines have yet been devised. Where weed growth is heavy the first and second applications have to be carried out systematically at full strength, but thereafter the cable routes can usually be kept clear of weeds by the application of the contents of an occasional tin. This dry treatment is also used wherever it is inadvisable to use liquid.

The way in which the chlorate acts upon the weeds is still not known. As the chief chemical action of the salt is as an oxidising agent, it has been suggested that this is its action on the plant. This apparently reasonable hypothesis, however, is not supported by the facts; there are other strong oxidising agents which do not produce the same effects in plants.

A plausible suggestion advanced by Boys* is that the chlorate radical has an affinity for the chlorophyll of the plant and combines with it rather as carbon monoxide combines with the hæmoglobin in the blood of the higher animals. He pointed out that, if this view is correct, plants which contain no chlorophyll, such as the fungi, should be immune to poisoning by chlorates, unless the application was heavy, when the injury would be similar to that caused by a high concentration of any salt. It has since been shown that mushrooms are actually stimulated by the application of sodium chlorate, and thus far Boys' suggestion is supported. It would be interesting to ascertain the action of chlorates on those parasitic members of the higher plants which are free from chlorophyll, such as the broom rapes. The difficulty is, of course, to attack the parasite without killing the host, but instructive results might be obtained by removing the parasites and keeping some with their cut ends in water and some in a solution of chlorate.

(To be continued)

* Sir C. V. Boys, *Weeds, Weeds, Weeds*, The Old Westminster Press. Wightman & Co., Ltd., 1937, p. 25-27.

Shrink-Proofing of Woollen Fabrics

IN an article on Shrink-Proofing of Woollen Fabrics (THE CHEMICAL AGE, 62, 783) it was stated that the cost of the dry chlorination process was 3d. to 6d. per lb. It has since been pointed out by the Wool Industries Research Association that the cost of the chemicals used is 3d. to 6d. per lb. The total cost is often considerably higher, as labour charges and the usual overheads have to be added to this figure.

It was also claimed that the product Chlorzyme wool had no tendency to irritate sensitive skins. While the treated wool has been shown to have a reduced irritating effect, that quality naturally depends to a large extent on the personal sensitiveness of the wearer.

CHOICE OF STIRRING APPARATUS

Insufficient Attention to Special Characteristics

THE choice of the most effective form of agitator for particular purposes from the multiplicity of types in common use is certainly not simple and, according to recently published French review, is commonly given much less study than it deserves.

P. A. Helmbold, introducing a survey of the commoner types of large-capacity instruments, in *Chimie et Industrie* (August, 64, 147-159), suggests that the selection of an agitator is often a haphazard one, insufficient attention being given to the particular requirements of the work to be done and even less to the fundamental factors governing agitation in differing conditions.

Three main types, objectives and alternatives distinguished are these: (1) Mixing two or more liquids (a) without precipitation but occasionally to produce an emulsion, (b) with precipitation or thickening; (2) mixing solids with liquids, (c) to obtain a simple suspension, (d) a solution of a solid, (e) a reaction with liquid result, (f) a reaction with solid result; (3) movement of a liquid to facilitate thermal changes, (g) for heating, (h) cooling without crystallisation, (i) cooling with crystallisation.

Operations which are not strictly stirring but have analogous movements are: (j) cleaning walls, (k) slow movement to facilitate and equalise decantation.

Power Requirements

Among the first considerations is the power required, a question not easy to decide by means of formulæ, in view of the many variable factors. A diagram may often be used such as that of International Engineering, Inc. (Dayton, Ohio), in which account is taken of volume or content, density, and viscosity, assuming the use of helical or beater type stirrers.

For other types of stirrer certain corrections are needed, as described by an I.G. Farbenindustrie engineer in 1937 (Walter Büche) and published in the VDI journal of that year. In this some of the required coefficients are given and are reproduced by Helmbold.

One instance is the solution of 9.5 per cent common salt in water, using a vessel with and without baffles. For quick results a higher speed was much more effective and economical than the use of baffles. It is true that turbulence is increased by roughened or irregular walls and by baffles, but opinions differ regarding its effect on stirring or solution, and further study is required—especially of large-scale operations. Turbulence certainly calls for a lot more power.

The different forms of beater agitators (brassage) are discussed and illustrated in the French review and special attention is given to zones of penetration and the relation existing between the times required to dissolve a given quantity of salt at continually increasing speeds. The rate of solution appears to follow laws closely analogous to those of heat transfer from a liquid to the walls of the container.

Speed Factors

Some factors governing optimum speeds are also briefly discussed, though the data involved are admittedly vague and variable. Among the more important are "pitching" cavitation, distance between the extremity of an arm and the wall, and, of course, the viscosity of material treated.

The more complex problem of selecting an agitator specially adapted to serve a particular purpose involves three major considerations: speed of stirring that will affect the whole content of vessel; power economy; and avoidance of a multiplicity of different kinds of stirring apparatus in the factory. The choice indicated in the review is related to the different kinds of work to be done, as already classified. It considers these instances:—

(a) Mixing of two or more liquids without precipitation.—In the simplest cases a plate or helical type machine will do very well. For liquids of different densities a strong upward movement is required, e.g., turbine with suction pipe, or two helices. For very heavy or viscous mixtures baffles and moderate speed are desirable. Special means will, of course, be needed for emulsifying.

(b) Mixing liquids with precipitation.—If the precipitate is light and flaky, similar apparatus to that in (a) will serve; but, if pasty or very viscous, a hand-worked stirrer is better, making provision for varying speed.

(c) Suspension.—These depend on the size of the particles in suspension, but high speed and preliminary grinding are generally necessary. The helical type seems to be generally preferred under speci-

fied conditions as to form of container and speed of working. Where damage or inconvenience from large particles is anticipated, it is often desirable to affix special arms or cutters on the shaft above the screw or helix.

(d) Solution of solid.—The technique here is similar, but more complex. A formula is given for speed of solution in terms of the surface area of solid S, the amount of solid absorbed by the liquid at saturation point and up to it (Cs and Ct) and K, a coefficient (empirical) for each solid and liquid. The speed of solution then is KS (Cs − Ct).

(e) Reaction without solidification.—A first essential here is to keep the solid constantly in the zone of maximum work or stirring, *i.e.*, at or near the centre. A German method is noted in which vessels used are of 30 or 40 cu. m. capacity, with bases in the form of inverted cones, the stirring agent, steam or air, being injected at the points of the cones.

(f) Reaction with solidification.—Account has to be taken of gradual solidification of the whole or part, for which special provision has to be made, including particularly speed control.

(g) Movement to facilitate heat exchange.—This as a rule requires maximum peripheral speed. Heating or cooling is commonly done by horizontal or vertical coils.

(h) Cooling, without crystallisation.—This is similar to the preceding case (g), but only a vertical coil can be used.

(i) Cooling, with crystal formation.—Crystals tend to form on the cool surfaces, such as the container walls. Stirring speed is adjusted so that the forming crystals act, according to their speeds, as cleaners. Where the crystals tend to adhere to the walls scrapers must be used. In many cases it is, of course, better to feed in fresh material at a temperature sufficiently high to prevent undue cooling. If large crystals are required movement is necessarily reduced. This adjustment is a difficult problem for which the complete solution has not yet been found.

Construction Economy of Outdoor Plants

THE wider application in U.S. industrial development of plant installations on the " outdoor " principle, extensively adopted by their chemical industries, was recommended at the recent meeting in Minneapolis of the American Institute of Chemical Engineers. There are several examples of the practice here, notably in some of the plants dealing with volatile materials, including the newer assemblies erected by British Industrial Solvents, Ltd., near Hull.

The opinion that the open-type plant may be built with less material, which in times of national emergencies would permit more production units to be built, was offered in a symposium on " Indoor Versus Outdoor Plants " given before the AICE. The leader of the symposium was Dr. J. R. Minevitch (Boston, Mass), of E. B. Badger & Sons, Company, a design and construction firm for the chemical and petroleum refining industries.

Dr. Minevitch said that in the southwest, in a recent expansion in the chemical field which cost many million dollars, 10 per cent of the construction costs were saved because of the prevalent use of outdoor and semi-outdoor construction.

" Such economical building practices are not limited solely to the chemical and petroleum field," said Dr. Minevitch, " since the principles may be expanded to other industries and production units, though possibly modified." As an example, he cited the new trend of building steam-power plant as semi-open units. For a million dollar plant investment, 28 per cent of the cost would normally be spent for construction of enclosed buildings, but if this same plant were constructed as an open type, only 17 per cent of the cost would be spent on buildings, he said.

The other speakers stressed advantages other than savings in cost. Mr. W. H. Williams, of the Dow organisation, analysed the effect of weather on such construction. He claimed that by means of proper engineering, unhoused processing plants operated without a fall in temperatures which at times went down to as low as 20° below freezing point.

The engineer from the Du Pont Company, Mr. H. S. Kemp, discussed the experiences of his company in successfully designing and installing an outdoor acetic acid concentration plant. He said substantial savings were realised in the construction of the outdoor plant since brick walls, their concrete foundations and building heating were eliminated, and lighting equipment was reduced.

Mr. Kieweg stressed the safety features of such construction, especially where ventilation of toxic and hazardous vapours is a factor.

RAPID TESTING OF WELD STRENGTHS

Marked Advances Using New Pressure Plant

A NEW pulsating pressure plant installed at the Abington centre of the British Welding Research Association was the principal item of interest shown to the technical Press during a visit to Abington on September 19.

This plant is intended to test vessels and other products by repeated applications of pressures. There are two main advantages of this type of test over the normal static pressure test. First, vessels which will be subjected to varying pressures in service can be tested under similar conditions during their initial development, so that a relation between material properties, service stress and life expectation can be established. Secondly, this test is said to be capable of distinguishing between two designs of otherwise equal merit far more readily than will a static test.

The simplest form of plant for this purpose is constituted by a pump whose connection with the test vessel is alternately "make and break." Several designs of pulsating pressure plant are possible, the main difference between them being the manner in which the valve which controls this connection is operated.

In the plant at Abington this valve is controlled by a pneumatic-hydraulic arrangement. The controlling system consists of a piston travelling in a cylinder (marked "servo piston" and "servo cylinder" in the diagram) which is so designed that the piston will move when the pressure difference between its two sides is between 1 and 1.5 per cent. The pressure in the test vessel is communicated to the space in the cylinder on one side of this piston and the pressure set in the "upper-pressure limit vessel" is communicated to the other side.

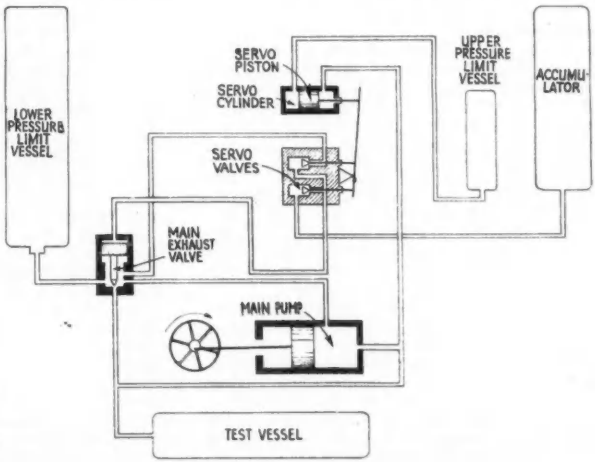
The main exhaust valve controls the passage of fluid from the test vessel to the large cylinder in which the lower pressure limit is set. When this valve is open, the test vessel and the "lower-pressure-limit vessel" ore in connection, and the pressures in both are equal.

The Servo Operation

When the valve is closed, the main pump draws fluid from the lower pressure limit vessel, and pumps this into the test vessel. This pressure is communicated to one side of the servo piston, and when it reaches 1½ per cent more than the upper pressure limit the piston travels along the cylinder. This moves the connecting lever and operates the two servo valves, which are attached to the lever in such a way that when one is open the other is closed. When the test vessel has been pumped to its upper limit and the piston has moved along the cylinder, the upper servo valve is open and a direct passage is available for fluid from the top of the exhaust valve to the suction side of the pump.

Because there is now very litle pressure above the exhaust valve and the full upper limiting pressure below it, this valve is forced open. As soon as this occurs, fluid flows from the test vessel into the

(*continued at foot of next page*)



Essentials of Current Patent Procedure

Some Changes Introduced by the New Act

THE Patents Act of 1949, which came into effect at the beginning of this year, did not materially affect the main principles of patent law, although certain changes are of importance to the inventor and manufacturer.

The main changes relating to applications for patent protection are dealt with in a 16-page booklet issued by King's Patent Agency, Ltd. Another valuable guide for manufacturers to the new Patents Act and its changes has been written by Mr. Robert Lochner, barrister-at-law, who is standing counsel to the National Union of Manufacturers on patents and designs. The book is published by the National Union. (2s. 6d.).

Adequate Description

An application for a patent, which must be filed at the Patent Office, can be accompanied either by a provisional specification or a complete one. A provisional specification, however, needs to contain an adequate description of the invention or process. Badly drafted, it may result in the invalidation of the patent, or in the post-dating of the application.

Full patent rights date from the filing of the complete specification, and the patent runs for 16 years from this date, provided the necessary renewal fees to maintain it are paid. According to the 1949 Act, every complete specification is required particularly to describe the invention and the method by which it is to be performed. It must disclose the best method known to the applicant of performing the invention, and must end with a claim defining the scope of the invention.

Limiting Claims

The claims of a complete specification must relate to a single invention, must be clear and succinct, and must be fairly based on the matter disclosed. These claims are regarded as the most important part of the application and, if drafted too narrowly, may leave the way open for the easy avoidance of the patentee's rights. If, on the other hand, these claims are drafted too widely, the whole patent may be bad for lack of novelty, or of inventiveness. The preparation of these claims calls for technical and specialised skill.

An important matter affected by the new Act is that, once an applicant had filed a provisional specification under the old law, he could safely use and publish details of his invention, and would not thereby deprive himself of any priority rights in the invention or in its development. This may not hold good under the new conditions and, until the provisions of the new Act relating to priority dates have been construed by the court, it is advised that it will be safer to assume that the old priorities will continue to apply to the invention described in the provisional specification but may not apply to its legitimate development.

Mr. Robert Lochner, in his book, states that this is a matter of great importance to those manufacturers who, in the past, have adopted the practice of applying for provisional protection for an invention prior to testing on a commercial scale.

Registration Costs

Fees, as from June 1, 1950, for an invention of average complexity requiring, say, a provisional specification of about 10[illegible] words, are: Provisional (12 months' cover) £6 15s.; complete specification, following provisional patent, including Government stamp fees (except sealing fee) for first four years from date of filing, £17 10s.; complete patent (no provisional) for four years as above, £19 10s.

Amendments and hearings, except when of a very trivial nature, involve a nominal extra charge, usually about £3 3s. to £5 5s. Drawings, when required, are charged according to the work involved in their preparation, averaging £2 5s. for a simple subject. The sealing fee, payable on acceptance, including an agency charge, is £2.

RAPID TESTING OF WELD STRENGTHS

(*continued from previous page*)

lower pressure limit vessel, and the pressure in the test vessel drops to that in the lower limit vessel.

Simultaneously the pressure on one side of the servo piston drops to this lower limit, and causes the piston to travel in the reverse direction, closing the upper servo valve and opening the lower one. This allows fluid under pressure from the accumulator to pass to the top of the exhaust valve piston. The pressure on the top is now greater than that at the bottom, and consequently this valve closes and a fresh cycle of pumping is begun.

Technical Publications

PROBLEMS involved in production of a pressure-tight circumferential seam and the progress made towards their solution are discussed in "The Welding of Thick Aluminium Alloy Plates by the Argon Arc Process" published in "Welding Research" (Vol. 4, No. 4) (British Welding Research Association).

* * *

THE training of future export executives, of considerable importance to the commercial prospects of the country, has been closely studied by the Institute of Export, whose current syllabus of education, now available, has been revised to meet present economic and commercial conditions.

* * *

PLASTIC mouldings for electrical connectors and connector strips are the subject of a new illustrated leaflet available from Precision Components (Barnet), Ltd.

* * *

THE gas phase in equilibrium with a solution of carbon, oxygen, hydrogen, and nitrogen in liquid iron is evaluated by J. D. Fast in "Philips Research Reports" (Vol. 5, No. 1), which also presents physical, chemical and technical papers covering the results of experimental and theoretical research carried out in the laboratories of the Philips industries.

* * *

AN information leaflet from Crompton Parkinson, Ltd., London, describes the Magnicon, a self-regulating alternator which has been developed by the Macfarlane Engineering Co., Ltd., Glasgow, to obtain the advantages of automatic voltage regulation without the additional cost of special regulating equipment.

* * *

MOTORS and control gear for laboratory and industrial use are listed in a booklet obtainable from Higgs Motors, Ltd., Witton, Birmingham.

* * *

THE need to keep the public informed of achievements of medical science—especially discoveries made possible by experiments on animals—is the object of the journal of the Research Defence Society. The publication, formerly *The Fight Against Disease*, is to appear quarterly or bi-monthly under the new title of *Conquest*. Particular attention will be given to progress in the development of such agents as insulin, the sulphonamides, penicillin and other antibiotics, natural and synthetic insecticides, hormones and Antrycide.

PROPERTIES and uses of regenerated cellulose film were the subject of a paper recently delivered by E. H. Dock to the Southern Area of the Institute of Packaging. The paper, with the ensuing discussion, is reproduced in the summer issue (No. 9) of the institute's journal.

* * *

ALUMINIUM coatings on steel are the subject of technical notes in the September issue of "Aluminium News" published by the Aluminium Union, Ltd., Montreal, Canada. The four main processes in commercial operating today—hot dipping, cladding by rolling, spraying and calorising—are described.

* * *

METHODS of reducing air pollution by the drop forging industry in the U.K. and the U.S.A. are compared in the autumn issue of "Smokeless Air" (No. 75), journal of the National Smoke Abatement Society. An account is also given of the work of the British Coal Utilisation Research Association at Leatherhead, and a first report is included of the United Staes Technical Conference held in Washington in May dealing with the solution of all air pollution problems."

* * *

PUBLICATION of *Spectrochimica Acta*, the international research journal devoted to spectrochemistry, has been taken over by Butterworth-Springer, Ltd., starting with Volume No. 4, of which the first number is now available. The editorial policy remains unchanged. Hilger & Watts, Ltd., Hilger Division, have been appointed sole selling representatives in Great Britain.

* * *

A NEW subject has been introduced in the DECHEMA series, "Exchange of Experience." (Deutsche Gesellschaft f. chem. Apparatewesen E.V.). Professor K. Thormann, Dr. Eng., has collected all the essential facts about laboratory distillation and rectification under the heading "Laboratory Distilling Apparatus."

The work, which covers 69 pages, is divided into two sections, one dealing with distillation apparatus in which a column is employed, and the other with apparatus dispensing with the column. There is a general discussion of the different types of apparatus in use and a section entitled "Principles for the Operation of Distillation Apparatus with a Column." An index of standards is included.

The Chemist's Bookshelf

QUANTITATIVE ULTRAMICROANALYSIS. L. Kirk. 1950, New York. Wiley and Sons, Inc. London: Chapman and Hall, Ltd. Pp. viii + 310. Figs. 113. 40s.

To those familiar with chemical operations on the microgram scale, this book will probably prove to be both a stimulus and a disappointment. From the time when, in the 1930's, an organised attack began to be made on problems in this range from an academic point of view rather than as a hand-to-mouth solution of some specific problem, the imagination of many analytical chemists has been stirred by the ingenuity displayed in devising techniques which would enable the worker to handle and to measure the extraordinarily small amounts of material involved. The techniques developed are in many cases as different from the established techniques of microanalysis as the latter were from the procedures of classical chemistry. In this book many of the techniques have been described within one cover. Frequently, the original methods have been modified and improved, either as research or as teaching operations, by Professor Kirk, who is one of the foremost workers in the field, and his co-workers. In certain respects the material will be directly applicable by workers requiring just these techniques or slight modifications of them.

The disappointment will arise from the feeling that the author has attempted either too little or too much. Most people wishing to develop microgram methods may be assumed to be reasonably familiar with commoner aspects of modern analytical chemistry. Consequently the space devoted, for example, to the principles and practice of ordinary colorimetry could have been saved, or used to advantage in other directions. To dismiss the polarograph in 14 lines when colorimetric procedures are dealt with so fully seems to indicate lack of balance.

Space thus saved might well have been used to include qualitative procedures, which must, in many cases, precede quantitative analysis. The techniques are sufficiently closely allied to be dealt with, at this stage of development, within the same handbook. The valuable pioneering work of Benedetti-Pichler and his co-workers in the field of qualitative inorganic analysis would thus have received its due credit. It is a matter of some wonder that in the 350-odd references the name of Benedetti-Pichler can be found only twice.

The last chapter, dealing very briefly with physical methods, could also perhaps have been expanded, since a number of measurements of physical properties other than melting point, boiling point, density and conductivity have been described in the literature, which use sample amounts no larger than those required for the methods detailed in the book. Such methods would be required from time to time by many microanalysts.

Three chapters are devoted to descriptions of the apparatus and techniques which have been developed for titrimetric and colorimetric methods on microgram samples. Detailed examples of a wide range of analyses utilising these techniques and derived procedures are then given, and a number of gas-volumetric and spectrophotometric methods are also described at some length.

From a survey of these as an entity, it is quite clear that the omissions already mentioned can largely be explained by the author's approach to the subject as an exponent of biochemistry and his preoccupation with the methods as they can be induced to serve the biochemist. The determinations which have been described in detail are largely those with which the biochemist is concerned. Many of the major advances described by Professor Kirk have been made by, or to fill the needs of biochemists. Nevertheless, it is perpetuating a one-sided view of things to suggest, as does this book in its choice of material, that it is principally in the field of biochemical analysis that microgram procedures will find chief use.

Analytical chemists who are concerned with minute samples will undoubtedly make these and similar criticisms for themselves. But it is likely that they will, however, use the book for many years as a valuable first source of techniques, and as an indispensible part of their everyday reference literature.— C.L.W.

OVERSEAS CHEMISTRY AND INDUSTRY

INDUSTRIAL DEVELOPMENT IN JAPAN

Large Expansion Achieved with U.S. Aid

THE substantial development of industrial production in Japan under American administration is reflected in an economic review of 1949 issued by the International Reference Service of the U.S. Department of Commerce.

Appreciable progress was made during the year in most sections of the chemical industry, aided by a favourable raw material and power situation.

The index of chemical production in December reached about 92 per cent of pre-war (1932-36 average), a considerable increase over the monthly average for the year as a whole (80.6 per cent). The average monthly index in 1948 was 56 per cent.

Although the output of all major chemical fertilisers recorded significant gains, the production of calcium cyanamide, which increased 71 per cent over 1948, was particularly important in raising the over-all index for chemicals. Supporting the rise in the index of chemical production was the increased output of many industrial chemicals, agricultural insecticides, dyes, printing ink and synthetic resins and plastics.

Increased Export Products

Production of important export commodities such as glass, rayon and other textiles, soap and processed foods increased appreciably, partly because of the remarkable achievement in the output of soda chemicals, which are the basic raw materials of these industries.

Production of soda ash for the year totalled 121,943 metric tons compared with 75,111 in 1948; post-war records were established in the production of 149,676 metric tons of caustic soda, 407,500 tons of salt, 86,691 tons of hydrochloric acid, 35,959 tons of bleaching powder and 10,419 tons of liquid chlorine.

Other important developments in the chemical field were the 175 per cent increase in production of printing ink over 1948; the output of 1,577,435 sq. metres of film compared with 1,305,519 metres in 1948; and the production of a wider variety of dyes.

Towards the end of the year Japan was producing 146 different dyes, at least 10 of which were manufactured for the first time since the end of the war. The quantities of some dyes produced permitted the resumption of the export of dyes at the beginning of the second half of the year. These exports, however, amounted to less than 4 per cent of dye production for the period.

As in previous years, and despite the further improvement in production during 1949, Japan imported considerable quantities of chemicals, principally chemical fertilisers. Imports of chemicals totalled $55,661,000, of which fertilisers and fertiliser materials (mainly phosphate rock, phosphates, and potash) amounted to more than $40,600,000. Exports of chemicals including drugs and medicines, on the other hand, amounted to about $4,555,400.

Imports and exports of chemicals by commodity groups and subgroups in dollars, were as follows:—

	Imports	Exports
Chemicals	55,661,048	4,555,412
Pigments, paints and varnishes	6,344,568	936,858
Drugs and pharmaceuticals	1,413,538	2,397,629
Chemical fertilisers ...	40,607,234	39,291
Insecticides, pesticides, and other fertilisers	1,369,207	202,871
Explosives	—	4,546
Toiletries and cosmetics ...	494,789	73,459
Industrial inorganic chemicals	3,039,341	690,616
Industrial organic chemicals	1,360,241	84,241
Industrial organic chemical products	714,950	—
Chemical specialities and miscellaneous items ...	317,180	125,901

The index of mineral production averaged 103.9 for 1949 (1932-36 equals 100), representing an advance of 15 per cent above the 1948 average. Most of the components of the index (sulphur, crude petroleum, pyrites, zinc ore, lead ore, copper ore, iron ore) rose more than the over-all average, ranging from 22 per cent for crude petroleum to 53 per cent for sulphur. Coal production, which has the greatest weight in the mining index, however, advanced only 13 per cent over 1948 and lignite production was about 19 per cent below that of 1948. The coal and lignite industries, however, had recovered more rapidly than the other mining industries in the earlier post-war period.

The year 1949 marked a significant upward trend in production of petroleum. The average monthly output of crude was

18,129 kilolitres, a 22 per cent increase from the monthly production in 1948. Output of refined petroleum products also increased to a monthly average of 16,214 kilolitres, a 10 per cent advance over the 1948 average.

During the summer of the year under review new geophysical equipment arrived in Japan from the United States to be used in a survey of the oil-producing regions of Niigata, Yamagata, and Akita prefectures, and in other potential oil-producing basins, in an effort to find new reserves for increased domestic production. (Japan's producing industry supplies only about 10 per cent of the country's requirements of petroleum products.) New reserves of 6,540,000 barrels were proved during the year.

The first step toward placing Japan's Pacific Coast oil refineries in operation in the post-war period was taken later in the year. SCAP granted approval for the repair and rehabilitation of five refineries which were expected to be placed in operable condition about the beginning of 1950.

The Japanese Government, industrial leaders, scientists, and others showed increasing readiness to improve Japan's industrial techniques with the help of U.S. technical experts.

Dutch Chemical Production Programme

THE State Mines of Limburg, Holland, have announced proposals for substantial extension of their chemical output. More than 13 million guilders is to be invested in its nitrogen division, and the total fertiliser output planned in 1952 is 538,000 tons. Estimates of other production next year are: tar products 56,000 tons, benzene 19,000 tons; sulphuric acid 80,000 tons; ammonia 29,000 tons; ethyl alcohol 36,000 hectolitres.

The pilot production of synthetic phenol is reported to have given satisfaction, but the State Mines are not intending at present to develop this or any other new productions, in spite of the persistent call from Dutch industrialists.

An interesting new product of the State Mines, styled Caprolactum, is the basic material of the Dutch competitor of nylon (Encalon), which is now being produced by Algemene Kunstzijde Unie after successful pilot plant trials. Caprolactum is to be polymerised by this firm at Emmen in a large plant to be erected in the near future. Large-scale production of Encalon is expected to begin in 1952.

DEVELOPING NATURAL RESOURCES

New Enterprises in Brazil

EXPORTS of peppermint oil from Brazil decreased from 83 tons in 1948 to 39 in 1949. American buyers reduced purchases, alleging that the Brazilian oil, which is extracted from the "arvensis" variety, is less suitable for dental paste and perfumery than the "piperita". The latter will in future be grown in San Paulo in order to recapture the North American market. Great Britain was the chief purchaser last year, followed by France and Holland. The price averaged £3578 per ton.

* * *

THE Refinaria Paulista S.A. is to build a cellulose and paper factory in San Paulo, which will operate with bagasse of sugar cane. The process followed will be that of the "Celdecor South Africa", and part of the equipment will be purchased in Great Britain. The company aims at producing 5000 tons of paper annually and should begin operating within two years. The bagasse will be obtained from cane used in the distillation of alcohol. It will be technically more advanced than the three similar factories planned earlier. Unlike those in the Philippines and India, which have separate installations for the production of cellulose and paper, the San Paulo factory will have one complete installation, bagasse entering on one side and the finished product leaving on the other.

* * *

THE San Paulo State Government is about to install a factory, the first of its kind in Brazil, to process soya beans. As a start it will produce 6 tons of edible oil and flour daily. The oil may also be used in the preparation of glycerin, paints, varnishes, celluloid, etc. The factory will be experimental, and, if successful, a group of industrialists will build another for commercial purposes in 1951 at a cost of £240,000. The soya bean hitherto has only been cultivated in Brazil as a fertiliser and for cattle food.

* * *

THE State of Rio Grande do Sul has now 49 million black-wattle trees (black acacias). Small groves have recently been planted in other States, and Brazil expects to produce 16 million lb. of extract for the tanning industry in 1950. Approximately 60 per cent of the output will be solids, instead of the liquid form, in which it was produced in the past. This will facilitate export shipments.

PROGRESSIVE CANADIAN RESEARCH

Important Work on Fundamental Themes

THE 33rd annual report, for 1949-50, of the National Research Council of Canada reflects steadily increasing activity at the Chalk River, Ontario, atomic energy project. The radioactive Cobalt 60 and industrial radiology in place of radium being produced there for use in medical is being made in the NRX reactor with higher specific activity than has been attained anywhere else in the world. This energy project. The radioactive Cobalt 60 unit permits sharper pictures to be made than would be possible with a more diffuse source.

The highly successful performance of the NRX pile, providing the greatest known flux density of neutrons, is cited as a tribute to the ability of the Canadian engineers and scientists. They have also acquired experience with a heavy-water reactor, which is thought to have unique possibilities.

In the pure chemistry branch, the National Research Council reports considerable expansion during the year in the organic chemistry section. Work on alkaloid chemistry has been continued, and some important results have been obtained on the synthesis of alkaloids in plants, using radioactive carbon as a tracer. In photochemistry, work has been continued on free-radical reactions, and much more reliable data have been obtained for a wide variety of methyl-radical reactions.

Calorimetric Measurements

Much work in the surface chemistry section has been done on the establishment of the low temperature scale for calorimetric measurements. A second mass spectrometer has been constructed for the detection of short-lived intermediates in gas reactions. In colloid chemistry a new method has been developed of measuring vapour pressures of solutions which shows great promise as a method of determining molecular weights of low molecular-weight polymers and other substances.

One of the applied chemistry branch projects started last year by the chemical engineering section is the application of the fluidised-bed technique to the recovery of petroleum from Alberta tar sands and from New Brunswick oil shale, and of elemental sulphur from sulphide ores. The tar sands investigation, which has now reached the pilot-plant stage, is expected to prove a practical method when additional or emergency sources of liquid fuels are required.

Other major projects under investigation deal with the use of lignin as a compounding agent in synthetic rubber and the production of chemicals from petroleum, the latter being concerned principally with catalysts. The work on lignin is being sponsored and financed by industry. Other projects sponsored by industry are concerned with catalysis and lubrication.

In the physics division, the spectroscopy group, using a 21 ft. grating spectrograph, has investigated the spectrum of isocyanic acid (HNCO) and determined the structure of this molecule. The nuclear spin of the He^3 isotope has been determined from its band spectrum and the rotation-vibration spectrum of the HD molecule has been observed.

The Raman spectrum of fluorine has been obtained for the first time.

Wider Use for Czech Glass

THE Czechoslovakian glass industry is reported to be making a partial diversion of its production from ornamental goods to more utilitarian ware, including a wide range of chemical and laboratory glass and parts of technical machinery and instruments. These include forks and thread guides for textile machinery, precision measuring instruments, heating apparatus and heat-resisting utensils, and a number of items where glass is taking the place of metals, such as piping, valves and pumps.

Representative specimens of this work were displayed at the 51st Prague International Trade Fair. Apparatus to stand temperatures above 1500° C. is being made of quartz glass, and another special product is the television valve in which Czechoslovakia claims to hold a prominent place.

Growing Importance of Alberta

In deciding to establish an independent trade commissioner post at Edmonton, the British Government has been influenced by the growing economic importance of Alberta, stimulated by the development of her resources of oil and natural gas. The new officer is Mr. Frederick Ingilby Lamb, who was until recently one of H.M. trade commissioners at Montreal. He took up his new duties on September 15.

Next Week's Events

MONDAY, OCTOBER 2

Royal Institute of Chemistry

London: School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. 6.30 p.m. "Coal Smoke—Its Nature and Prevention" by Dr. A. C. Monkhouse. (In conjunction with the London Section, Society of Chemical Industry).

Incorporated Plant Engineers

London: Royal Society of Arts, John Adam Street, Adelphi, W.C.2, 7 p.m. F. L. Griffiths: "The Heat Pump."

Brewers' Exhibition

London: Olympia, National and Empire Halls (until October 6).

TUESDAY, OCTOBER 3

Incorporated Plant Engineers

Cardiff: Grand Hotel, Westgate Street, 7.30 p.m. South Wales Branch. H. Power: "Transmission Problems."

Chemists' Exhibition

London: New Royal Horticultural Hall, Westminster (until October 6).

WEDNESDAY, OCTOBER 4

Institute of Welding

Manchester: Reynolds Hall, College of Technology, 7 p.m. G. Davenport: "Notes from My Welding Experiences."

Society of Public Analysts and Other Analytical Chemists

London: Burlington House, Piccadilly, W.1, 7 p.m. A. M. Smith, A. Comrie and A. K. Simpson: "The Evaluation of Liming Materials for Agricultural Purposes"; H. N. Wilson: "The Accurate Determination of Phosphoric Anhydride by means of Quinoline Phosphomolybdate"; L. Brealey: "The Determination of Potassium in Fertilisers by Flame Photometry."

THURSDAY, OCTOBER 5

British Institution of Radio Engineers

Manchester: Reynolds Hall, College of Technology, 7.15 p.m. Dr. P. F. R. Venables: "Education in Industry."

International Bottling Equipment Exhibition

Paris: (until October 15).

International Packaging Exhibition

Paris: (until October 15).

Royal Institute of Chemistry

Dagenham: S.E. Essex Technical College, Longbridge Road. 6.30 p.m. "The Public Analyst and His Work" by Thomas McLachlan, F.R.I.C.

FRIDAY, OCTOBER 6

British Paper and Board Makers' Association

Manchester: The Engineers' Club, Albert Square. 6 p.m., Dinner. 7 p.m. "Some Aspects of China Clay in Paper" by Dr. N. O. Clark and R. J. Booth.

The Institute of Fuel

Liverpool: Radiant House, Bold Street, 7 p.m. "Steam Generation": Brains trust (R. G. Evans, A.M.I.Chem.E., W. Murray, F.R.I.C., R. H. Thompson, B.Sc. and J. S. Brundritt).

Society of Chemical Industry

Edinburgh: 10 a.m. Opening of two-day joint meeting of the Fine Chemicals Group and Edinburgh Section. Dr. F. Bergel, chairman of the group: "The Biological and Therapeutic Significance of Organic Phosphates Occurring in Nature." Afternoon: Visit to I.C.I., Grangemouth. Glasgow: Royal Technical College, 7.15 p.m. Joint meeting of the Food Group and the Glasgow Section. Dr. E. H. Callow (DSIR Low Temperature Research Station, Cambridge): "Frozen Meat."

Manchester: Reynolds Hall, College of Technology, 6.30 p.m. J. McKillop, chairman's address: "The Theory and Practice of Accident Prevention."

Oil and Colour Chemists' Association

Cheetham: Town Hall, 6.30 p.m. Second post-graduate lecture. Dr. A. S. C. Lawrence: "Topics in Colloid Chemistry."

SATURDAY, OCTOBER 7

Society of Chemical Industry

Edinburgh: Fine Chemicals Group and Edinburgh Section. Anatomy theatre, the University. 10 a.m. Professor G. F. Marrian, F.R.S. Third Lister Memorial Lecture. "The Adrenocortical Hormones."

Institution of Chemical Engineers

Manchester: Reynolds Hall, College of Technology, 3 p.m. Professor D. M. Newitt, president: "Operating Conditions in High Pressure Plant."

Chemical Engineers' Examinations

Changes have been made in the period in which are held the examinations of the Institution of Chemical Engineers. It has been customary hitherto to hold the A and B sections of the examinations between January and March, and the C-F sections in April and May. In 1951 the A and B sections will again be held from January to March but the C-F sections will be held in September. The candidates who would normally be taking sections A and B in January 1952 will instead take these examinations in September 1951.

· OVERSEAS ·

Thailand Tin Production

Thailand's tin ore production in June was 1210 tons. This figure, though a post-war record, is less than half the total produced in December, 1939—2457 tons.

Italian Import Licensing

Included among the goods which may be imported freely into Italy from member countries of the OEEC is a wide range of chemicals, metallic ores, crude tar oils, oils and products of the direct distillation of coal, rare gases, radioactive elements and their compounds and various alcohols and acids. A detailed list is published in the *Board of Trade Journal* (159, 2805).

New Canadian Oil Refinery

Construction of an oil refinery at Froomfield near Petrolia, Ontario, was announced recently by Mr. Harild Rea, president of Canadian Oil Companies. The refinery, estimated to cost $18 million, will process crude oil from Alberta. Processing is to begin in April, 1952, and it is expected that a saving of U.S. $17.5 million yearly will be effected.

Russia Resumes Manganese Shipments

Notwithstanding the strained relations between the United States and the U.S.S.R., the latter is again shipping substantial quantities of manganese to America. Formerly a major U.S. supplier, Russia virtually cut off shipments after the United States in 1948 restricted exports of strategic war materials to Russia. In July Russian shipments to the U.S.A. totalled $800,000 in value, compared with $200,000 in February.

Monsanto's New Texas City Plant

The Monsanto Chemical Company, St. Louis, Mo., U.S.A., is shortly to undertake an expansion programme for its Texas City operations which, in the next few years, will involve the expenditure of about $30 million. The principal objective is to expand production of acrylonitrile and related chemicals direct from acetylene. Construction of the new facilities is to begin immediately and the size of the present plant at Texas City is expected eventually to be doubled. The principal outlet for the acrylonitrile will be in the production of synthetic textile fibres by Monsanto's recently formed subsidiary, the Chemstrand Company, and by others chemical organisations.

Canadian Synthetic Rubber

Expansion of the Government's synthetic rubber plant at Sarnia, Ontario, was announced recently by Mr. Howe, Canadian Minister of Trade and Commerce. The project, which will cost $6.6 million, will enable the plant to cope with its domestic and foreign orders, which at present exceed the productive capacity.

New Carbon Black Unit

The Continental Oil Black Company has been organised jointly by the Continental Carbon Company and the Continental Oil Company in the U.S.A. to produce 25 million lb. annually of high abrasion carbon black from oil. It will build a $1.5 million plant at Lake Charles, Louisiana, which is scheduled for completion early in 1951.

Possible Cortisone Substitute

A report in the *Lancet* indicates that Netherlands scientists hope that a certain liquorice extract may prove a possible substitute for cortisone. The extract is said to react in a similar way to deoxycortone and ACTH, both of which in effect resemble cortisone. Although the extract had a negligible effect on a patient with rheumatoid arthritis it is hoped that, with further research, the liquorice extract will prove useful in curing other diseases.

Scandinavian Light Congress

At the Scandinavian Light Congress, held recently at Oslo, speakers voiced the opinion that good lighting increased productivity by 5 to 25 per cent and reduced the amount of faulty work by 20 to 25 per cent. It was urged that lighting technique should be a subject in the curriculum at technical colleges. The Technical High School in Denmark has in fact already established Scandinavia's first professorate in lighting technique.

Over £4 M. More for Australian Chemicals

A further addition to the capital of the I.C.I. group in Australia, which will bring to £10 million the total paid up capital of I.C.I. of Australia and New Zealand, Ltd. is being secured to expand the scope of the subsidiary's production and trading. The issue, in Melbourne, of £1,006,500 ordinary £1 shares at 22s. 6d. is being made publicly and, with the recent £3 million 4 per cent debenture issue, will add £4,125,813 of new capital. Hitherto, most of the Australian group's ordinary capital (64½ per cent) has been provided by I.C.I., Ltd.

PERSONAL

MR. J. S. RAMSDEN has decided to relinquish his seat on the board of the British Thomson-Houston Co., Ltd., on September 30, after more than 40 years' service with the company—15 of them as a director. He will, however, remain with the company in a consultative capacity, and is retaining his seat on the boards of the British Thomson-Houston Export Co., Ltd., Ferguson Pailin, Ltd., and the Switchgear Testing Co., Ltd. Mr. Ramsden obtained his early technical education in Bolton, Lancs., and later at the Manchester School of Technology. After gaining experience as a textile engineer and later with the British Westinghouse Company in Trafford Park and with the Electric and Ordnance Accessories Co. (Vickers, Ltd.), he joined the BTH drawing office staff in 1910. He has been chairman of the Dynamo and Motor Association since 1932 and is a member or officer of many other organisations concerned with electrical engineering.

Newman Industries, Ltd., announces that MR. E. B. PIGGOTT has resigned from the position of secretary of the company for health reasons. Mr. Charles Bush, previously an executive of Wimpey, Ltd., has been appointed to succeed him.

MR. GAVIN LAWSON, chief chemist and director of Cumming, Parsons, Ltd., essence distillers. left £8671 gross, with net personalty £7733.

Obituary

MR. JOHN BLACK, Dunlop's divisional manager for Scotland, has died suddenly at the age of 54.

The death has occurred of MR. FRANCIS HERBERT JOHNSON, sales manager of Fassett and Johnson, Ltd., Clerkenwell.

The death has occurred of MISS W. E. FENN, editor of *The Rubber Age and Synthetics*, who was also a director of the company, Rubber & Technical Press, Ltd.

Fertilisers Advisory Committee

A reconstituted committee to advise the Ministry of Agriculture on the making of regulations under the Fertilisers and Feeding Stuffs Act, 1926, was announced this week. The chairman is Mr. Edmund Bacon and its members include Mr. H. H. Bagnall, Mr. A. M. Cameron, Dr. E. M. Crowther, Dr. D. N. McArthur, Dr. J. Manning, Mr. G. Taylor, and Mr. Eric Voelcker. Dr. J. R. Nicholls, of the department of the Government Chemist, will be among the representatives of Government departments.

BEILBY MEMORIAL AWARDS

INVESTIGATIONS related to chemical engineering, metallurgy and fuel economy carried out by young men who have been concerned in original independent work of exceptional merit over a period of years, will again be recognised this year by awards from the Sir George Beilby Memorial Fund.

The administrators of the fund, representing the Royal Institute of Chemistry, the Society of Chemical Industry and the Institute of Metals, will decide early next year to whom these awards shall go. Recommendations concerning work of merit on the lines indicated are invited, before January 1, 1950. More than one award may be made; last year there were three, each of 100 guineas, for works on mechanical properties of metals, the behaviour of gases in metals, and the study of carbon and its oxidation by steam (THE CHEMICAL AGE, 62, 650).

Recommendations should be addressed to the convener of the administrators, Sir George Beilby Memorial Fund, Royal Institute of Chemistry, 30 Russell Square, London, W.C.1.

Laboratory Explosion Verdict

CHEMISTS at the Wrexham inquest, on September 20, on two men killed in an explosion at the laboratories of Monsanto Chemicals, Ltd., Cefn Mawr, Ruabon, on June 26, could offer no theory as to the cause of the explosion. Later laboratory tests under similar conditions failed to produce any explosive effect. A verdict of accidental death was returned on William Ward, process worker, and Richard Henry Biggs, foreman process worker. Mr. Maurice V. Evans, East Denbighshire coroner, said there was no evidence of criminal negligence.

Questioned by Mr. Hywel Jones (for the families of the dead men), Dr. E. M. Francis, head of the production section, said the cause of the explosion was still obscure. It was the first time he had made the particular experiment on a large scale. Replying to Mr. Daniel Bradin (for the Monsanto Company), Dr. Francis said the fullest experiment had been made to exclude all points of danger.

Another chemist, Dr. R. A. Baxter, described laboratory experiments after the explosion. Substances used had been treated under similar conditions, including a blockage under pressure, and they had been unable to produce an explosion. The substances were not in themselves explosive.

HOME

Wolfram Dearer

Prices of wolfram were again increased during the week. On September 20 prices ranged from 225s. to 235s. nominal a unit, c.i.f. compared with 220s. to 225s. on September 18.

U.K. Quicksilver

The price of quicksilver per flask of 76 lb. delivered U.K. was raised on September 25 to £23 10s. to £24 10s. compared with a previous quotation of £23 to £24 10s.

Tin Prices Firmer

Following an advance of about £20 on the London Metal Exchange on September 20, prices of tin remained firmer, with settlement at £788 in the closing session. Business was quiet on September 21, but on September 25 in the closing session turnover was 105 tons including 10 tons cash, settlement £807.

Scrap Iron and Steel Orders

Scrap alloy steel and stainless steel scrap is released from price control, but not from control of acquisition and disposal under a new Ministry of Supply order which became effective on September 18. The Iron and Steel Scrap Order, 1950, S.I. 1950, No. 1523 consolidates the Control of Iron and Steel (Scrap) Orders 1948-1950 and lists a number of price amendments.

Lorry Driver's Bravery in Calcium Fire

The I.C.I. industrial gold medal is to be presented to Mr. Harry Thornton, a Widnes motor driver, for outstanding bravery. On June 27, rain which had leaked into some aluminium drums of calcium on his lorry caused a fire at Gaskell Marsh Works, Widnes. Thornton drove his lorry to a safe spot and, ignoring the heat, unloaded the drums, thus preventing a serious works fire.

Bradford May Test TB Vaccines

The Medical Research Council has invited Bradford to participate in controlled clinical trials of the BCG and Vole vaccines for the prevention of tuberculosis. Approval of the request was recommended by the Health, Care and After-Care Committee of the corporation. Dr. V. P. McDonagh, deputy medical officer of health, states that these trials would probably involve at the outset children leaving secondary modern schools at 15, with regular examinations for three years. A start would probably be made in January.

Liverpool Site in Prospect

Kirkby Trading Estate, Liverpool, has been named as the possible site of a new factory for Albright & Wilson, Ltd., of Oldbury, Birmingham.

Standard Tin Price Adjustment

The computed average increase of the standard tin (99.75 per cent metal content) reference price of £600 a ton has been fixed at £80, the Ministry of Supply announced this week. This amount is payable to merchants who bought at £600 a ton before the devaluation of sterling.

Coal Production

Output of coal last week, both deep-mined and opencast, showed a small increase over the previous week. Comparative figures are:—Last week: 4,296,900 tons (deep-mined 4,053,300 tons, opencast 243,600 tons). Previous week: 4,199,400 tons (deep-mined 3,965,300 tons, opencast 234,100 tons).

Plastic Lens

The latest development in Nife, industrial electric lamps is the use of a new one-piece combined bezel and lens which is screwed directly onto the headpiece of miniature cap lamps used extensively in the mines. Moulded in optically pure Perspex, it is extremely strong and increases the lamp's candle-power by about 10 per cent, giving wide light diffusion.

Oil Imports Freed

Restrictions of imports of crude oil and petroleum products from soft-currency countries, or imported from British-controlled producing companies or refineries in any country, have been lifted. Open licences will be issued only for imports which require sterling not convertible into dollars or the currency of the exporting country.

New Quay for Iron Ore

A new 1000 ft. quay capable of berthing two iron ore vessels at once is being built at Bidston Dock, Birkenhead, by the Mersey Docks and Harbour Board. It will be used to supply Hawarden Bridge Steelworks at Shotton, Chester, where a blast furnace plant is being built, and will take ships carrying up to 12,000 tons of cargo. Discharge of the ore from ship to wagon will be by two electric transporter cranes with a lifting capacity of 13 tons. Deliveries of the ore from Bidston Dock are expected to begin in 1952, and the transporters will deal with at least 850,000 tons a year.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ALUMINIUM REFINERS, LTD., Manchester. (M., 30/9/50). August 29, £5000 debenture to D. Daniels, London, general charge. *Nil. November 26, 1947.

F. A. BILLINGTON (CHEMISTS), LTD., Rowley Regis. (M., 30/9/50). August 31, mortgage to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on property at Rowley Hill, Rowley Regis, and fixtures. *Nil. September 8, 1948.

CROSS & MAX, LTD. (formerly CROSS & MAY (AGENCIES), LTD.), London, E.C., dealers in chemicals, etc. (M., 30/9/50). August 24, assignment, securing, to Midland Bank, Ltd., any amount now due or to become due at any time from Cloister Laboratories, Ltd., to the chargees; charged on certain money. *Nil. December 31, 1949.

LEEDS CHEMICAL CLEANING WORKS, LTD., Bradford. (M., 30/9/50). September 1, £24,000 charge, to Heritable Securities & Mortgage Investment Association, Ltd., Edinburgh; charged on specified properties at Manchester, etc. *Nil. March 12, 1949.

LONDON CAPSULE CO. (1950), LTD., Croydon. (M., 30/9/50). August 24, £1000 second mort., to F. C. Ells, Angmering; charged on Empire Works, Mitcham Road, Croydon; also August 28, £4800 mortgage to London & Manchester Assurance Co., Ltd.; charged on Empire Works, Mitcham.

MERTHYR TYDFIL CERAMICS, LTD., Cardiff. (M., 30/9/50). August 31, debenture to H.M. Treasury Solicitor securing £10,000 not ex.; charged on specified lands at Merthyr Tydfil and a general charge.

Change of Name

The name of SIMMONDS PRODUCTS, LTD., has been changed to SPOSS PRODUCTS, LTD.

Company News

Ilford, Ltd.

The dividend on the 6 per cent cumulative preference shares of Ilford, Ltd., for the half-year ending October 31, is to be paid on November 1.

The Ketton Portland Cement Co., Ltd.

Net profit for the year ended June 30 of the Ketton Portland Cement Co., Ltd., was £71,332. A final dividend of 10 per cent on the ordinary shares plus 2½ per cent bonus has been declared, making a total of 17½ per cent for the year.

Lewis Berger & Sons, Ltd.

Dividend on the ordinary stock of Lewis Berger & Sons, Ltd., has been continued at 33 per cent.

Murex, Ltd.

Consolidated trading profits for the year ended April 30 at £905,494 were more than £30,000 larger than in the previous year. A final dividend on the ordinary stock of 6 per cent, making 10 per cent for the year, has been approved.

New Registrations

Agricultural Spraying Co., Ltd.

Private company. (485,956). Capital £100. Consultants and contractors for the prevention and destruction of pests, plant and animal diseases, and manufacturers of insecticides, fungicides, chemicals, etc. Subscribers: J. P. M. Morris, and J. E. S. Keyse. Reg. office: Houghton Hall, Cavendish, Suffolk.

Archanium Co., Ltd.

Private company. (486,029). Capital £100. To acquire the business of manufacturing chemists carried on by the Archanium Company at Ellenden, Sandhurst, Kent. Directors: G. Hayworth, and P. Nesfield. Solicitors: McMillan & Mott, 212 High Holborn, W.C.1.

Dow Corning, Ltd.

Private company. (486,170). Capital £100. To import, export, manufacture and deal in chemicals and chemical compounds (in particular chemical compounds of silicon whether combined with inorganic elements or with organic radicals or carbon-containing groups, organo-silicon compounds, and polymeric organo-silicon products such as silicones), etc. The first directors are not named. Solicitors: Slaughter & May, 18 Austin Friars, E.C.2.

(continued at foot of next page)

Chemical and Allied Stocks and Shares

ACTIVITY in stock markets has reached its highest level this year mainly as an effect of the big demand for rubber shares, which took dealers by surprise and rapidly forced up prices. Although best levels have not been held, gains at the time of writing range up to over 10s. in £1 shares and small-priced 2s. shares record rises of over 50 per cent compared with a week ago. The prevailing view is that even if the price of rubber went back to 2s. 6d. lb. next year most companies would still earn good profits; while so long as the present level of over 4s. lb. is maintained there are prospects of materially increased dividends. The commodity price is now at its highest for 25 years, having reached slightly more than 4s. 8d. lb.

British Funds recorded moderate declines and industrial shares failed to hold best levels, mainly because buying interest for the moment is centred on Far East securities. Imperial Chemical came back to 42s. 7½d., but Fisons were firm at 27s. because of the good yield, assuming hopes of a 9 per cent dividend total for the year are realised. Albright & Wilson showed firmness at 30s. 3d. "ex rights" to the new 5 per cent preference shares which were up to 1s. 10½d. premium over the issue price at which they were offered to shareholders. Laporte Chemicals 5s. units were 10s. 6d., Brotherton 10s. shares again firm at 20s. xd., Monsanto 5s. shares at 51s., Boake Roberts 30s. 3d. Calor Gas 5s. shares were 20s. 6d. and Pest Control 7s. 6d. Lawes Chemical were 10s. 6d., Amber Chemical 2s. shares 2s. 9d., F. W. Berk 10s. 9d., Bowman Chemical 4s. shares 5s. 3d., and British Chemical & Biologicals 4 per cent preference 17s. 3d. Woolley 4¾ per cent debentures kept at 104½. William Blythe 3s. shares were 9s. 6d. xd.

The decision of Lever Brothers & Unilever to issue £10 million of 3¾ per cent debentures at 98½ created a good impression in the market, because this is a public issue, contrasting with the private placings made a short while ago by Imperial Chemical and the Distillers Co. The Lever policy is taken as a reflection of the much better conditions which have developed in markets over the past few weeks. Over-subscription of the issue is confidently predicted; the new debentures are a first-class investment and their interest requirements are covered more than 30 times. Lever's £1 units at 41s. 10½d. eased slightly because it has not been found possible to offer shareholders preferential terms of allotment in the new issue. Although profits of the English company may be lower, those of the Lever group as a whole are expected to be maintained.

Boots Drug have firmed up to 50s. 3d., Glaxo Laboratories 10s. units have been active around 49s. 9d. and British Aluminium strengthened afresh to 45s. 3d., Borax deferred were 55s., while, pending the results, British Celanese remained active around 24s. 9d. on higher dividend expectations. Nationalisation steel shares were again moderately lower owing to selling and exchanging into other securities. Elsewhere, Stavely were firm at 84s. 6d. awaiting the results. The 4s. units of the Distillers Co. have been active up to the higher level of 20s. British Xylonite were 82s. 6d., British Industrial Plastics 2s. shares 6s. 1½d. and De La Rue up to 25s. 6d. Oils were more active, with sharp gains in Anglo-Iranian and British Borneo Petroleum.

NEW REGISTRATIONS

(*continued from previous page*)

Glazebrooks (Holdings), Ltd.

Public company. (485,530). Capital £300,000. Manufacturers, importers and exporters of and dealers in oils, paints, dyes, etc. Director: E. C. Coverdale, Tattlebank House, Claverdon, Warwick. Reg. office: 20 James Road, Tyseley, Birmingham.

Huth & Co. (Industrial & Transport Developments), Ltd.

Private company. (485,444). Capital £25,000. Importers, exporters and manufacturers of chemicals, plastics, etc. Subscribers: E. H. Athanassoglou, White Ledges, St. Stephens Road, Ealing, W., and J. K. Stach, 35 Canfield Gardens, N.W.6. Reg. office: 67/70 Ibex House, Minories, E.C.3.

B. A. McCalla, Ltd.

Private company. (485,716). Capital £15,000. To acquire the business of a chemical, glaze and enamel manufacturer carried on by Bertram A. McCalla at Hanley, Stoke on Trent, and to carry on the business of chemists and potters' merchants, etc. Directors: H. A. McCalla and Mrs. H. E. McCalla, both of 25 Priory Road, Newcastle under Lyme. Reg. office: Bucknall Works, Bucknall Old Road, Hanley, Stoke on Trent.

Midland Silicones, Ltd.

Private company. (486,179). Capital £100. The objects and other particulars are similar to those of Dow Corning, Ltd.

Prices of British Chemical Products

Strong Markets and Rising Oxide Prices

WITH a fairly wide demand continuing both for home and export account, values throughout the industrial chemicals market remain steady, with a strong undertone. New bookings for the textile and plastics industries have been on a good scale, and consumers' specifications for deliveries against existing contracts have been to the full extent of commitments. Despite the strong markets, there have been no outstanding price changes other than the movements brought about as a result of the fluctuations in metal prices. There is an active demand for the potash chemicals and the barium compounds and inquiries for bleaching powder remain brisk. A good inquiry is reported from all sections of the coal tar products market and the price position remains firm.

MANCHESTER. — Firm price conditions, especially in regard to metal compounds, continue to be reported on the Manchester market for heavy chemical products. Bicarbonate of soda, soda ash and caustic soda, among the alkali products, are being taken up by home users in good and regular quantities, and a steady demand has been reported during the past week for a wide range of other chemicals. Shippers' inquiries have been fairly numerous. Moderate activity is reported in the market, fertiliser compounds being among the busiest sections. A brisk demand for cresylic acid (duty-free in America) is an outstanding feature of the tar products market.

GLASGOW.—The Scottish heavy chemcial market has been exceedingly quiet during the past week. Export business is reacting to the international situation and is extremely low.

Price Changes

Rises: Antimony oxide, copper carbonate, copper chloride, copper nitrate, red lead, white lead, litharge, magnesium carbonate, magnesium oxide, mercuric chloride, mercurous chloride, potassium iodide, tartaric acid, zinc oxide, ammonium sulphate, I.C.I. special No. 1 compound fertiliser.

General Chemicals

Acetic Acid.—Per ton: 80% technical, 1 ton, £61; 80% pure, 1 ton, £66; commercial glacial 1 ton £71; delivered buyers' premises in returnable barrels; in glass carboys, £7; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £110 per ton.

Acetone.—Small lots: 5 gal. drums, £90 per ton; 10 gal. drums, £85 per ton. In 40/45 gal. drums less than 1 ton, £70 per ton; 1 to 9 tons, £69 per ton; 10 to 50 tons, £68 per ton; 50 tons and over, £67 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 1d. per proof gallon; 5000 gal. lots, d/d, 2s. 2½d. per proof gal.

Alcohol, Diacetone.—Small lots: 5 gal. drums, £133 per ton; 10 gal. drums, £128 per ton. In 40/45 gal. drums: less than 1 ton, £113 per ton; 1 to 9 tons, £112 per ton; 10 to 50 tons, £111 per ton; 50 to 100 tons, £110 per ton; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non returnable drums; 1 ton lots £47 per ton.

Ammonium Carbonate.—1 ton lots: MANCHESTER: Powder, £52 d/d.

Ammonium Chloride. — Grey galvanising, £27 10s. per ton, in casks, ex wharf. Fine white 98%, £21 10s. to £22 10s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Amyl Acetate.—In 10-ton lots, £171 10s. per ton.

Antimony Oxide.—£182 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots, as to grade, etc., 1s. 9½d. to 2s. 4½d. per lb. Crimson, 2s. 6½d. to 3s. 3½d. per lb.

Arsenic.—Per ton, £38 5s. to £41 5s., ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £27 5s. per ton, bag packing, ex works.

Barium Chloride.—£35 to £35 10s. per ton.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £29 10s. per ton d/d; 2-ton lots, £29 15s. per ton.

Bleaching Powder.—£19 10s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140 lb. bags, carriage paid: Anhydrous, £54; in 1-cwt. bags, commercial, granular, £34 10s.; crystal, £37; powder, £38, extra fine powder, £39; B.P., granular, £44; crystal, £46; powder, £48-£48 10s.; extra fine powder £48.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granular, £62; crystal, £69; powder, £66 10s.; extra fine powder, £68 10s.; B.P., granular, £75 10s.; crystal, £81; powder, £78 10s.; extra fine powder, £80 10s.

Butyl Acetate BSS.—£144 10s. per ton, in 10-ton lots.

Butyl Alcohol BSS.—£135 10s. per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6½d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Cobalt Oxide.—Black, delivered, 9s. 10d. per lb.

Copper Carbonate.—MANCHESTER: 1s. 10d.-1s. 10½d. per lb.

Copper Chloride.—(63 per cent), d/d, 2s. 2d. per lb.

Copper Oxide. — Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(63 per cent), d/d, 2s. 1d. per lb.

Copper Sulphate.—£56 10s. to £59 per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £7 2s. per 10 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £103 10s. per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £66 to £67 10s. per ton, carriage paid.

Glycerin.—Chemically pure, double distilled 1260 s.g. 128s. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; bulk carriage paid.

Hydrochloric Acid.—Spot, 7s. 6d to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 18s. per lb. in cwt. lots.

Iodoform.—21s. per lb.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale tech., £85 per ton; dark tech., £75 per ton ex works; barrels returnable.

Lead Acetate.—Nominal.

Lead Carbonate.—Nominal.

Lead Nitrate.—Nominal.

Lead, Red.—Basis prices per ton: Genuine dry red lead, £146; orange lead, £158. Ground in oil: red, £166; orange, £178.

Lead, White.—Basis prices: Dry English, in 8-cwt. casks, £153 10s. per ton. Ground in oil: English, under 2 tons, £170 10s.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.

Litharge.—£146 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light commercial d/d, £74 5s.; cwt. lots £82 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light commercial, d/d, £187; cwt. lots £192 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 8s. 5d.; smaller quantities dearer.

Mercurous Chloride.—9s. 4d. per lb., (28 lb. lots).

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 3s. 7½d. per gal.; pyridinised 64° O.P. 100 gal., 3s. 8½d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb. (Nominal.)

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—About £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—From £58 10s. to £101 17s. 6d., according to grade for 1 ton lots.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £63 10s. per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1½d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 9⅝d. per lb.; ground, 10⅝d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 15s. 5d. per lb.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 6d. per lb.; technical, £6 13s. to £7 13s. per cwt.; according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—Dog-tooth crystals, £72 10s per ton; medium, £67 10s. per ton; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid.—MANCHESTER: 2s. to 3s. 4½d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£41-£55 per ton.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £29 12s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite. — Pea crystals £23 2s. 6d. a ton; commercial, 1-ton lots, £21 12s. 6d. per ton carriage paid.

Sodium Iodide.—B.P., 16s. 9d. per lb, in cwt. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £101 10s. ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £23 per ton.

Sodium Nitrite.—£29 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 17s. 9d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots: Di-sodium, crystalline, £32 10s., anhydrous, £65; tri-sodium, crystalline, £32 10s., anhydrous, £64.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 10s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot. £25 15s. per ton, d/d, in drums; broken, £27 5s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £15 11s. 6d. to £17 16s. 6d. according to fineness.

Sulphuric Acid.—160° Tw., £6 16s. to £7 16s. per ton; 140° Tw., arsenic free £5 10s. per ton; 140° Tw., arsenious, £5 2s. 6d. per ton; Quotations naked at sellers' works.

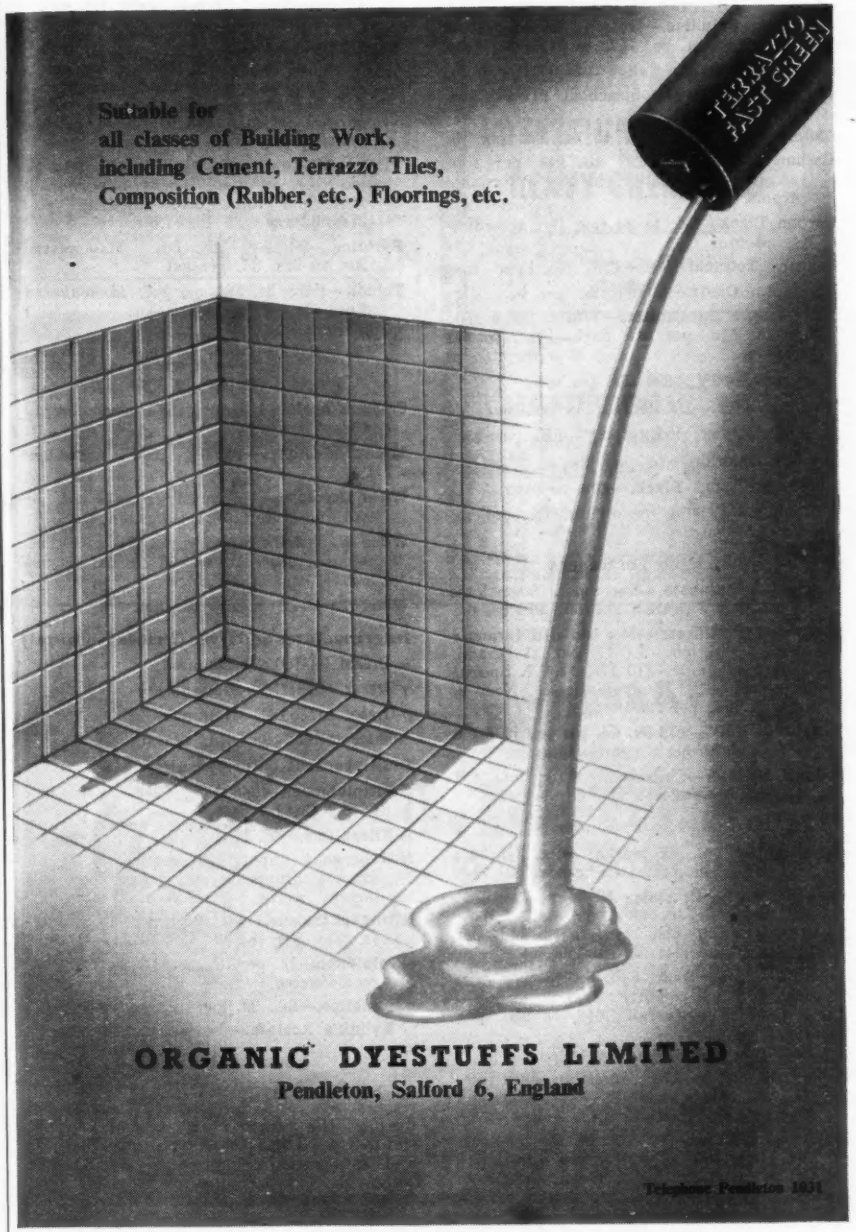
Tartaric Acid.—Per cwt: 10 cwt. or more £8 10s.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags) £102 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d; white seal, £139; green seal, £138; red seal, £136 10s.

Zinc Sulphate.—Nominal.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Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £12 9s. 6d.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £10 17s. I.C.I. Special No. 1, £19 14s. National No. 2, £11 0s. 6d. per ton

"Nitro-Chalk."—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean for 6-ton lots d/d nearest station, £19 17s. 6d. per ton.

Coal-Tar Products

Benzol.—Per gal, ex works: 90's, 3s. 3d.; pure, 3s. 5½d.; nitration grade, 3s. 7½d.

Carbolic Acid.—Crystals, 10¾d to 1s. 0½d per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 11¾d. to 1s. 1½d. per lb., d/d crude, 4s. 3d., naked, at works

Creosote.—Home trade, 6½d. to 9¾d. per gal according to quality, f.o.r. maker's works. MANCHESTER: 6½d to 9¾d. per gal.

Cresylic Acid.—Pale 98%, 3s. 3d. per gal.; 99.5/100%, 3s. 11d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 3s. 11d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190° 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

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Pitch.—Medium, soft, home trade, 90s. per ton f.o.r. suppliers' works; export trade, 110s. per ton f.o.b. suppliers' port. MANCHESTER: £5 10s. f.o.r.

Pyridine.—90/160°, 22s. 6d. MANCHESTER: 20s. to 22s. 6d. per gal.

Toluol.—Pure, 3s. 2½d. per gal. MANCHESTER: Pure, 3s. 2d. per gal. naked.

Xylol.—For 1000-gal. lots, 4s. 0½d. to 4s. 3d. per gal., according to grade, d/d.

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Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d to 5s. 6d per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%

Latest Oil Prices

LONDON: September 27. The prices of all refined oils and fats remain unchanged during the eight-week period ending October 7. The prices of all unrefined oils and fats remain unchanged during the four-week period ending on September 30.

Light Metal Totals

MINISTRY of Supply statistics relating to U.K. production, imports and consumption of light metals in July include the following (in long tons):—Virgin aluminium: production 2235, imports 9322. Secondary aluminium: production 6641. Aluminium scrap arisings 7710, consumption 9459. Aluminium fabrication 17,927, foil 796. Magnesium fabrication 286. Production of virgin aluminium was slightly less than in July last year (2517), but imports were considerably less than last year's July figure of 24,320 tons.

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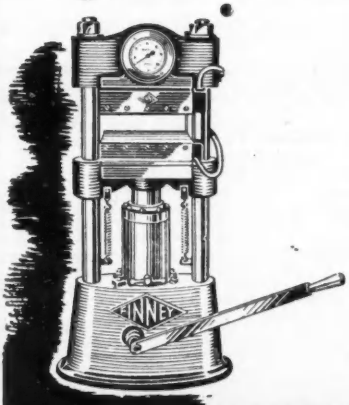

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SITUATIONS VACANT

APPLICATIONS are invited by the Division of Atomic Energy (Production) for the following appointments at Windscale Works, Sellafield, Cumberland.

Post 1. **RESEARCH MANAGER** to take charge of a group of laboratories engaged on applied research work in connection with a wide range of new chemical processes associated with atomic energy development. Experience in organising and directing industrial research work is essential and experience in the chemistry of radio-active elements would be an advantage. Candidates must be at least 30 years of age.

Post 2. **ASSISTANT RESEARCH MANAGERS** to be responsible to the research manager for leading teams engaged on the applied research work outlined above. Experience in industrial research work is essential and experience in the chemistry of radio-active elements would be an advantage.

Post 3. **ASSISTANT DEVELOPMENT MANAGER** to be responsible to the development manager for leading teams engaged on semi-scale and pilot plant experimental work in connection with the development of new chemical processes. At least three years' chemical factory or industrial laboratory experience is essential.

Post. 4. **RESEARCH CHEMISTS OR PHYSICISTS** to undertake chemical and radio-chemical research work associated with atomic energy development. Experience in an industrial laboratory is essential for the higher posts and experience in the chemistry of radio-active elements would be an advantage for certain other posts.

Candidates must have either a first or a second class honours degree in chemistry, associateship of the Royal Institute of Chemistry or equivalent qualifications. Alternatively, for Post 3 they must have either a first or second class honours degree in chemical engineering, associateship of the Institution of Chemical Engineers or equivalent qualifications, and, for Post 4, either a first or second class honours degree in physics, associateship of the Institute of Physics or equivalent qualifications. Houses will be available within a reasonable period for successful candidates who are married.

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No. 209 One **HORIZONTAL " U "-SHAPED MIXER,** steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft. wide by 3 ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

No. 210 One **HORIZONTAL MIXER** as above.

No. 211 One **HORIZONTAL MIXER** as above.

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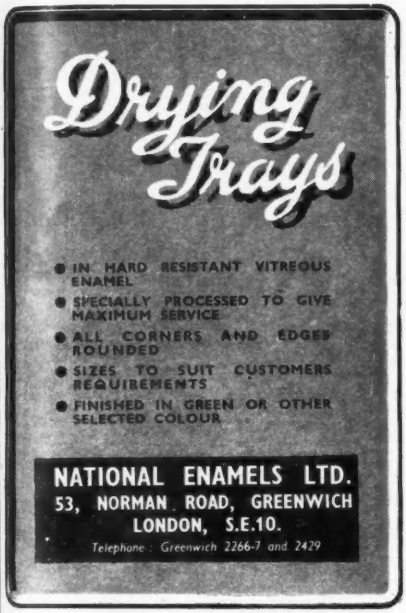
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